

**REFERENCE DOCUMENTS for  
PROPOSED LARGER TURBINES AND MET MASTS  
AT UPPERCHURCH WINDFARM  
for EIAR 2021 and AA 2021**

**REFERENCE DOCUMENT 13 of 36**

This document contains the following:

**UWF Related Works (LA ref. 18/600913, ABP ref. ABP-303634-19)**

- **2019 Revised Appropriate Assessment Report For UWF Related Works – Volume E1 (1 of 5)**
  - Revised Appropriate Assessment Report for UWF Related Works
  - Appendix A1: European Site Synopsis
  - Appendix A2: European Site Conservation Objectives
  - Appendix A3: Finding of No Significant Effects (FONSE) Report Screening Conclusion
  - Appendix A14: Scoping of Other Unrelated Projects

**VOLUME E**  
**REVISED APPROPRIATE ASSESSMENT REPORTING**

**UWF Related Works**

**Revised Appropriate Assessment Report**  
**For UWF Related Works**

January 2019

**Volume E1 (1 of 5)**

**Revised Appropriate Assessment Report for UWF Related Works**

**Appendix A1: European Site Synopsis**

**Appendix A2: European Site Conservation Objectives**

**Appendix A3: Finding of No Significant Effects (FONSE) Report Screening Conclusion**

**Appendix A14: Scoping of Other Unrelated Projects**



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# Volume E

## REVISED APPROPRIATE ASSESSMENT REPORT

# Revised Appropriate Assessment Report for Upperchurch Windfarm Related Works

February 2019



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## 2 INTRODUCTION

This Screening for Appropriate Assessment Report has been prepared by Inis Environmental Consultants, and contains information which will facilitate the Competent Authority to carry out an Appropriate Assessment for the Upperchurch Windfarm (UWF) Related Works project.

The preparation of this Screening for Appropriate Assessment Report has had regard to;

EU Habitats Directive (92/43/EEC),

EU Birds Directive (Council Directive (2009/147/EC)

the Part XAB of the Planning and Development Act 2000,

European Communities (Birds and Natural Habitats) Regulations 2011,

Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001,

Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (2010).

Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, European Commission, 2000.

### 2.1 Appropriate Assessment Process

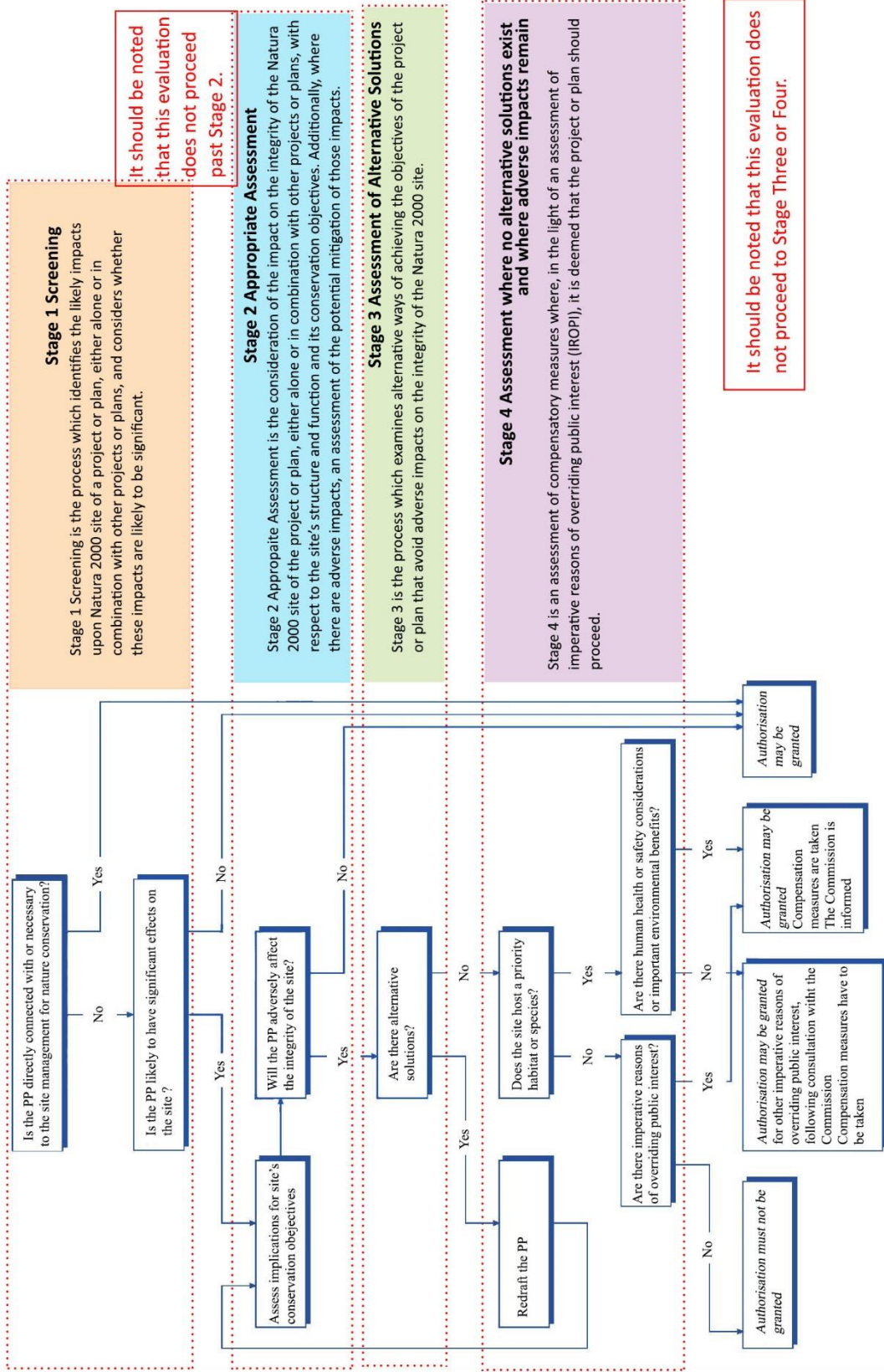
Under Article 6(3) of the Habitats Directive, an Appropriate Assessment of the implications of a project for the European Site concerned implies that, before a project is approved, all the aspects of the project which can, either individually or in combination with other plans or projects, affect the conservation objectives of that European Site must be identified, in the light of the best scientific knowledge in the field. The competent national authorities are to authorise an activity on the protected site only if they have made certain that it will not adversely affect the integrity of that site. The Screening for Appropriate Assessment identifies whether the project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives, or whether the potential for such significant effects can be excluded. This test is completed with cognisance of emerging case law.

#### 2.1.1 Stages of the Appropriate Assessment Process

Appropriate Assessment involves a number of steps and tests that are applied using a stage-by-stage approach. Each step or stage in the assessment process precedes and provides a basis for other steps. The four stages in an Appropriate Assessment (AA), as outlined in EC Guidance on Assessment of Projects<sup>1</sup> are illustrated in the following flow chart (over).

<sup>1</sup> Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001

**STAGES OF THE APPROPRIATE ASSESSMENT PROCESS FOR A PLAN OR PROJECT (PP)**



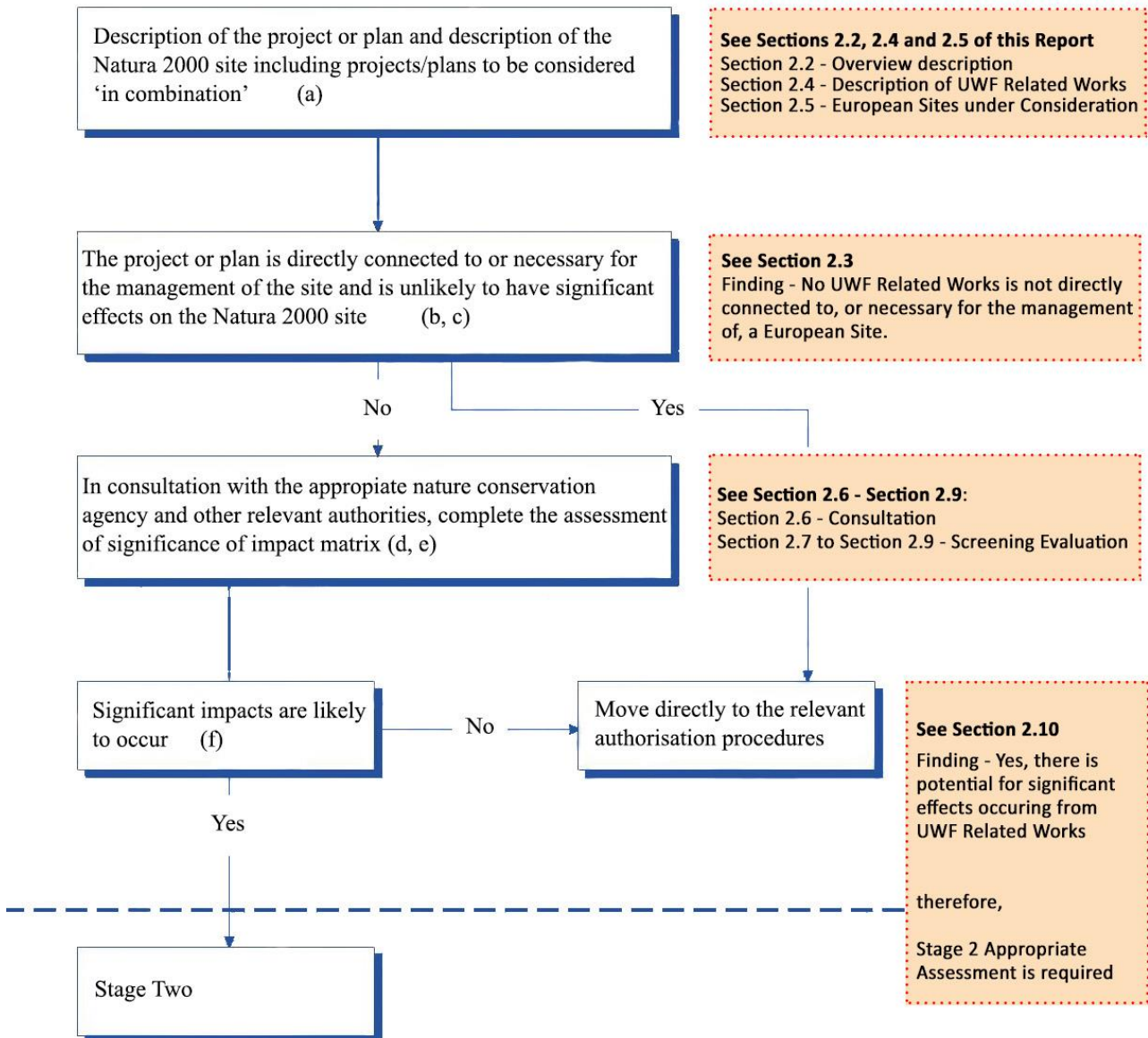
Source: Flow Chart and Description Notes from Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001

### 3 STAGE 1: SCREENING

#### 3.1 Screening Evaluation Process

The Screening process examines the potential for the UWF Related Works project, either alone or in combination with other projects or plans, upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant. The Screening evaluation comprises four steps, as outlined in the diagram below:

#### Stage One: Screening



Source: Flow Chart from Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001

## 3.2 Screening: Overview of the UWF Related Works Project

### 3.2.1 Overview

The UWF Related Works project, presented for appraisal in the subject appeal to An Bord Pleanála and detailed in this Appropriate Assessment Report, will consist of Internal Windfarm Cabling, Realigned Windfarm Roads, Haul Route Works, a Telecom Relay Pole and Ancillary UWF Related Works.

### 3.2.2 Purpose

The purpose of UWF Related Works is to connect the Consented Upperchurch Turbines with the Consented Upperchurch Substation, to realign two lengths of Upperchurch Windfarm Roads, and to provide access to a new relay pole which will mitigate impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseefin Mast, and to facilitate the haulage of turbine components to the Upperchurch Windfarm site.

## 3.3 Screening: Is the Project Directly Connected to or Necessary for Management of a European Site?

For a project or plan to be 'directly connected with or necessary to the management of the site', the 'management' component must refer to management measures that are for conservation purposes, and the 'directly' element refers to measures that are solely conceived for the conservation management of a site and not direct or indirect consequences of other activities.

**Finding:** No, the UWF Related Works project is not directly connected to or necessary for the management of a European Site.



### 3.4 Screening: Description of the UWF Related Works Development

#### 3.4.1 Location, Size, Scale, Landcover

The Internal Windfarm Cabling will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. Approximately 62% of the Internal Windfarm Cabling is located under Consented UWF Roads or Realigned Windfarm Roads, the remaining Cabling is located in the vicinity of the windfarm site. The Internal Windfarm Cabling consists of electrical cables, communication cables and the copper conductor cables which are installed inside High Density Polyethylene (HDPE) ducting in underground trenches. Cable Protection and Warning Tapes will also be laid in the trench. The trench will be excavated, ducting and warning tapes installed and the trench backfilled and reinstated. When the ducting installation is finished and the trench reinstated the electrical, communication and copper conductor cables will then be pulled through the ducting. The only surface expression of the Internal Windfarm Cabling will be the over-ground identification marker posts and marker plates which will be installed at regular intervals above the cables trench.

The Realigned Windfarm Roads are two sections of the already consented windfarm roads which require realignment and one length of new road to link a telecoms mast to the windfarm road. These changes are proposed for windfarm roads in agricultural and forestry lands in the townlands of Shevry, Knockmaroe, and Grousehall, which are all within the Upperchurch Windfarm site.

The Haul Route Works are proposed for public road verges, roadside boundaries and grassland fields located adjacent to the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 and R503 roads in the following townlands: Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe and Grousehall. Works include the removal of soils and laying of crushed stone and hard-core in roadside verges; temporary removal or partremoval of roadside boundaries; opening of temporary entrances and the construction of temporary access roads on private lands.

The Telecom Relay Pole is an 18m wooden pole proposed for a location in Knockmaroe townland, close to the existing Foilnaman Mast. Laghtseefin Mast is 9.5km directly south. The Relay Pole will be contained within a small compound, and a low voltage power and communications supply will be provided from the existing Foilnaman Mast. A short length of access road, Realigned Windfarm Road No. RWR3, will provide access to the Telecom Relay Pole from the Consented UWF Road network.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include temporary access roads; temporary and permanent watercourse crossings; temporary site entrances; change of use from 'agriculture' to 'forestry and agriculture' at the UWF Replacement Forestry entrance at Foilnaman; along with forestry felling; temporary and permanent hedgerow/tree removal; permanent hedgerow replanting; fencing; relocation of existing telephone poles and temporary storage of excavated materials; at various locations within construction works area boundaries..

See **Figure 1: Locational Context of UWF Related Works.**

See **Figure 2: Layout of UWF Related Works.**

### 3.4.2 Application of Protection Measures in the Screening Evaluation

The Screening evaluation to inform the AA process, presented in Section 2.8 and Section 2.9 below is **carried out in the absence of any protective** measures for UWF Related Works which may be required or prescribed to avoid or reduce harmful effects on designated European Sites.

### 3.4.3 Construction Stage

The construction process for the UWF Related Works, is a relatively straightforward civil build. A number of separate dedicated 'crews' will work from the consented compound associated with the Upperchurch Windfarm (Site Compound No.1), each working on a different part of the UWF Related Works. The workers will arrive and depart daily to and from the relevant construction compounds, parking spaces will be provided at the site compound. The various crews will then be transported to the specific works location by means of 'crew-cab' 4x4 vehicles or similar. Bulk deliveries of materials will be delivered to the site compound and stored there until needed. Materials required at works locations will be transported by way rigid body vehicle or tractor and trailer. Aggregate and concrete will be delivered directly to works locations.

#### 3.4.3.1 Construction Timescale and Resource Requirements

**Duration & Timing of Construction:** The main construction period will take 6 to 8 months to complete. The projected start date is towards the end of 2019. The UWF Related Works will take place during the same period as the construction of the Upperchurch Windfarm and potentially during the same period as Upperchurch Windfarm Grid Connection. Pre-construction activities will be carried out immediately prior to the commencement of the main construction period; these activities will include detailed design, confirmatory surveys, felling, and hedgerow or tree removal or pruning. Normal construction hours of work will be 07.00 to 19.00hrs Monday to Friday and 08.00 – 16.30hrs on Saturdays.

**Construction Personnel:** The civil and electrical construction personnel involved in the construction of the Upperchurch Windfarm will also be involved in the construction of the Internal Windfarm Cabling, Realigned Windfarm Roads, Haul Route Works and the construction of the Telecom Relay Pole compound and the installation of underground communication and electricity cables between the existing Foilnaman Mast and the Relay Pole compound, no extra personnel will be required for these works and c.5 personnel from the Upperchurch Windfarm construction crew will be involved in the UWF Related Works. A specialist communication engineering crew, made up of c. 3 personnel, will be involved in the erection and set up of the Telecom Relay Pole.

**Construction Materials** include 23 loads of semi-dry lean mix concrete, 285 loads of crushed stone, 7 loads of hard core for temporary public road surfaces, 2 loads of public road surface dressing, geotextile, ducts and duct jointing collars, electrical cabling, cable protection strip and warning tapes, cable marker posts and plates, Telecom Relay Pole and telecommunication equipment, hedging, fencing materials including posts, rails and wire, precast concrete and HDPE culverts, geotextile/plastic/bog matting.

**Machinery** to be used includes 2 tracked excavators, 2 tracked dumpers, compaction plate, cable pulling machine, vibrating roller, pole planter and auger drill, and 2 4X4 crew vehicles.

### **3.4.3.2 Construction Access**

HGV loads of aggregate, concrete and public road dressing will be delivered directly to construction works areas. These HGVs will travel to the works areas using both the regional and local road networks, as specified on Figure RW 5.23 (included at the end of Appendix A4).

Other materials, such as ducting, geotextile and other construction materials, will be sourced from various suppliers and will be transported to the Upperchurch Windfarm Site Compound No.1 via the national and regional road network, as identified on Figure RW 5.24 (included at the end of Appendix A4). This material will be stored at Upperchurch Windfarm Site Compound No.1 until required at works areas. Each day a smaller truck will be used to deliver the daily volume of ducting, matting, cable protection strip, warning tape, duct jointing collars etc. to each active works area.

### **3.4.3.3 Construction Methodology for UWF Related Works**

Outline Construction Methodologies (OCMs), *based on the standard construction methods*, for all of the main works and activities of UWF Related Works, which are listed below, can be found at Appendix A9: Environmental Management Plan of the UWF Related Works. In the OCMs, a brief description of the work involved; the duration of this work; personnel, machinery, equipment and tools requirements; construction materials; details of the standard methodology for the construction activities and any variations to those methods are also outlined. These OCMs are specific to each distinct body of work or activity. The final Method Statements for the construction works will be developed by the appointed Contractor and will be based on these OCMs. Construction stage activities will involve the following works:

- Pre-Construction Activities
- Construction Works Area Preparation
- Temporary Site Entrances
- Realigned Windfarm Roads
- Temporary Access Roads
- Haul Route Works
- Telecom Relay Pole
- Internal Windfarm Cabling
- Instream Works Preparation and Reinstatement
- Instream Works
- Bailey Bridge
- Relocation of Overhead Lines
- Felling of Forestry
- Overburden Storage Berms
- Reinstatement of Land

#### 3.4.4 UWF Related Works: Operational Stage

Once constructed and commissioned, as required, the UWF Related Works will be operated and maintained as part of the Upperchurch Windfarm.

**Operational Personnel:** The personnel involved in the operation and maintenance of the Upperchurch Windfarm will also be involved in the operation and maintenance of the UWF Related Works. In addition, 2-3 No. specialised telecommunications personnel will be involved in an annual inspection and maintenance of the Telecom Relay Pole.

**Duration of the Operational stage:** The duration of the operational period for the UWF Related Works will correspond with the operational period of the Upperchurch Windfarm which is granted for 25 years from the date of commissioning of the wind turbines under Condition 4 of the grant of planning permission for Upperchurch Windfarm, unless a planning period for a further period is granted.

**Operational activities** will take between 2 days and 2 weeks per year, mainly consisting of visual inspections (2 to 3 days per year), though 2 to 7 days of Haul Route Works activities may be required during turbine component deliveries which may occur infrequently during the operational stage of the windfarm.

#### 3.4.5 UWF Related Works: Use of Natural Resources, Emissions & Waste

**Use of Natural Resources:** 20.9 hectares of land within the full UWF Related Works construction site which is reduced to just 25m<sup>2</sup> around the Telecom Relay Pole compound, during the operational phase; 4750m<sup>3</sup> of topsoil, 6670m<sup>3</sup> of subsoil and 360m<sup>3</sup> of rock will arise from excavation works; small amounts of potable and non-potable water will be imported onto the site as required; 170m of hedgerow and 4 No. trees will be removed and the equivalent amount replanted following construction.

**Emissions:** Insignificant dust, construction machinery exhaust, noise, vibration and light will be emitted during the Construction Stage. During the Operational Stage there will be negligible dust, vehicle exhaust, noise, vibration and light emitted. The operational electrical plant will be a source of electromagnetic fields but these emissions will be negligible - c. less than a tenth of the International Commission on Non-Ionising Radiation Protection exposure limit, at a point directly above the operating cable.

**Waste:** UWF Related Works personnel will use the welfare facilities and waste facilities provided at the Windfarm Site Compound No. 1 and No. 2. At these facilities, waste water will be contained in self-contained units and emptied by a licenced facility or, in the case of the Site Offices, will be treated in the existing septic tank. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at Site Compound No.1 and collected by an appropriately licenced waste contractor. There will be minimal general and chemical waste during the Operational Stage. This waste will be stored in a designated and secure area at the windfarm site offices and collected by an appropriately licenced operator. Welfare facilities for the O&M crew will be provided at the windfarm site offices. Any wastes which result from the construction, operation and decommissioning of UWF Related Works will be managed under the Waste Management Plan for the operating UWF.

### **3.4.6 Description of Other Projects**

This Screening evaluation takes a conservative approach, in that, in that it presents an evaluation to determine what pathways of connectivity arising from the UWF Related Works, and any European Site with potential to be affected by UWF Related Works is screened in for further detailed evaluation at Stage 2 of the Appropriate Assessment process.

### 3.5 European Sites under consideration

#### 3.5.1 Distance of the Development to European Sites

For the UWF Related Works, a zone of impact, identified as the range of potential project effects extending from the proposed construction and operational elements, has been assigned. This takes account of all UWF Related Works project elements and the pathways of connectivity to designated European Sites within this zone.

Taking account of the project impact pathways and the sensitivities of designated European Sites in the wider area, it was determined that pathways for connectivity were limited to those sites occurring within a 15km radial distance. This has been applied around UWF Related Works and further is extended to include a 15km area around all of the other elements of the Whole UWF Project in order to establish whether or not the UWF Related Works either alone or in-combination with the other elements of the Whole UWF Project is likely, or has potential, to have a significant effect on a European Site.

There are 23 European Sites within the extended Study Area - nineteen Special Areas of Conservation (SAC) and four Special Protection Area (SPA for birds). These European Sites are identified in **Table 1**.

**Table 1: Proximity of European Sites to the Development**

	European Site	Distance from UWF Related Works
1	Slievefelim to Silvermines Mountain SPA (004165)	0m (see *Note below)
2	Lower River Shannon SAC (002165)	1.5 km
3	Lower River Suir SAC (002137)	3.0 km
4	Anglesey Road SAC (002125)	2.9 km
5	Bolingbrook Hill SAC (002124)	7.2 km
6	Keeper Hill SAC (001197)	10.9 km
7	Silvermine Mountain SAC (000939)	11.5 km
8	Silvermine Mountain West SAC (002258)	12.5 km
9	Philipston Marsh SAC (001847)	13.0 km
10	Kilduff, Devilsbit Mountain SAC (000934)	13.7 km
11	Clare Glen SAC (000930)	17.0 km
12	Glenstal Wood SAC (001432)	17.1 km
13	Slieve Bernagh Bog SAC (002312)	28.4 km
14	Lough Derg, North-East Shore SAC (002241)	28.5 km
15	Glenomra Wood SAC (001013)	31.4 km
16	Tory Hill SAC (000439)	40.4 km
17	Ratty River Cave SAC (002316)	44.5 km
18	Askeaton Fen Complex SAC (002279)	48.2 km

	European Site	Distance from UWF Related Works
19	Barrigone SAC (000432)	62.0 km
20	Curraghchase Woods SAC (000174)	50.6 km
21	Lough Derg (Shannon) SPA (004058)	24.5 km
22	River Shannon and River Fergus Estuaries SPA (004077)	34.5 km
23	Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)	67.3 km

**\* Note on the Proximity of UWF Related Works to the Slievefelim to Silvermines Mountain SPA:** the site boundary of UWF Related Works overlaps the Slievefelim to Silvermines SPA at HW7, where a small section (0.05ha) of SPA is included in the 'tail-swing' space for Upperchurch Windfarm turbine blade deliveries. No works or removal of habitat will occur within the SPA, as the turbine blades will simply sweep over the area as the transporting trailer is being turned around in the existing yard.

The locational context of the above 23 European Sites is illustrated on **Figure 3: European Sites within the extended Study Area for UWF Related Works**. A brief description of these Sites, including their Qualifying Interests/Special Conservation Interests, is provided in **Table 2**.

**3.5.2 Description of European Sites under consideration**

A brief description of the 23 no. European Sites within the extended study is provided in Table 2 below. The Site Synopsis and Conservation Objectives for each site are available in full in Appendix 1 and also on the National Parks & Wildlife Service website at <https://www.npws.ie/protected-sites>

**Table 2: Description of European Sites within the study area for UWF Related Works**

European Site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source Last accessed online on 01/02/2019
1 Slievefelim to Silvermines SPA (004165)	Hen Harrier ( <i>Circus cyaneus</i> ) (A082)	This SPA is an upland site located in Counties Tipperary and Limerick. It includes the peaks Keeper Hill, Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site is underlain mainly by sandstones of Silurian age. Several important rivers rise within the site, including the Mulkear, Bilboa and Clare. The Slievefelim to Silvermines SPA is of ornithological importance because it provides nesting and foraging habitat for breeding Hen Harrier. The annex I species Merlin and Peregrine have also been recorded on site.	Sourced from NPWS Conservation Objectives for Slievefelim to Silvermines Mountains SPA [004165]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 21/02/2018]
2 Lower River Shannon SAC (002165)	Alluvial Forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* (91E0) Coastal Lagoons* (1150) Sandbanks which are slightly covered by sea water all the time (1110) Estuaries (1130) Mudflats and sand flats not covered by seawater at low tide (1140) Large shallow inlets and bays (1160) Reefs (1170) Perennial Vegetation of stony banks (1220) Vegetated sea cliffs of the Atlantic and Baltic coasts (1230) <i>Salicornia</i> and other annuals colonizing mud and sand (1310) Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> ) (1330)	This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head. The site encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breenagh and Glenacarne. Rivers within the sub-catchment of the Mulkear include the Killeenagarraff, Annagh, Newport, the Dead River, the Bilboa, Glashacoonaraveela, Gortnageragh and Cahernahallia. This site contains the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. This site supports more wintering wildfowl and waders than any other site in the country and supports a large number of migratory birds.	Sourced from NPWS Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. [Version dated 07/08/2012]



European Site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source Last accessed online on 01/02/2019
	<p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (1410)                      Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (3260)  <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>) (6410)  <b>Annex II Species:</b>                      Freshwater Pearl-Mussel (<i>Margaritifera margaritifera</i>)(1029)                      Atlantic Salmon (<i>Salmo salar</i>) ((only in fresh water) (1106)                      Sea Lamprey (<i>Petromyzon marinus</i>) (1095)                      Brook Lamprey (<i>Lampetra planeri</i>) (1096)                      River Lamprey (<i>Lampetra fluviatilis</i>) (1099)                      Bottlenose Dolphin (<i>Tursiops truncatus</i>) (1349)                      Otter (<i>Lutra lutra</i>) (1355)</p>		
<p>3                      Lower River Suir SAC (002137)</p>	<p>Alluvial Forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, <i>Salicion albae</i>)* (91E0)                      Yew Woodlands <i>Taxus baccata</i> woods of the British Isles* (91J0)                      Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (1330)                      Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (1410)                      Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (3260)                      Hydrophilous tall herb fringe communities of plains and of the montane (6430)                      Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (91A0)</p>	<p>This SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Muiteen and Clodiagh in Co. Tipperary. The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds to the ecological interest and importance of the site.</p>	<p>Sourced from NPWS Conservation Objectives: Lower River Suir SAC 002137. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 28/03/2017]</p>

European Site Name and Code		Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat		Summary Description (from Site Synopsis)		Data Source Last accessed online on 01/02/2019
4	Anglesey Road SAC (002125)	Freshwater Pearl-Mussel ( <i>Margaritifera margaritifera</i> ) (1029) White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )(1092) Sea Lamprey ( <i>Petromyzon marinus</i> ) (1095) Brook Lamprey ( <i>Lampetra planeri</i> ) (1096) River Lamprey ( <i>Lampetra fluviatilis</i> ) (1099) Twaite Shad ( <i>Alosa fallax fallax</i> ) (1103) Salmon ( <i>Salmo salar</i> ) (1106) Otter ( <i>Lutra lutra</i> ) (1355)	Species-rich <i>Nardus</i> Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230)	Anglesey Road is a steep-sided valley which extends approximately 1.8 km along the Muiteen River to the north of Hollyford village, Co. Tipperary. It contains a range of habitats and species. It is of particular importance for the good quality examples of species rich, unimproved, upland grassland found.	Sourced from NPWS Conservation objectives for Anglesey Road SAC [002125]. Generic Version 6.0.. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 21/02/2018]	
5	Bolingbrook Hill SAC (002124)	Species-rich <i>Nardus</i> Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010) European Dry Heaths (4030)	Species-rich <i>Nardus</i> Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010) European Dry Heaths (4030)	This upland SAC is approximately 6 km south-east of Silvermines village in Co. Tipperary. It comprises Bolingbrook Hill and the nearby eastern slopes of Silvermine Mountains in Curryquin and Mucklin townlands. Good quality examples of species-rich, unimproved upland grassland are present within this site	Sourced from NPWS Conservation objectives for Bolingbrook Hill SAC [002124]. Generic Version 6.0.Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 05/07/2018]	
6	Keeper Hill SAC (001197)	Blanket Bogs (* if active bog) (7130) Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010)	Blanket Bogs (* if active bog) (7130) Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010)	This SAC is situated between the Silvermines and Slieve Felim Mountains, 13 km south of Nenagh in Co. Tipperary. Consisting of a steep peak of Old Red Sandstone is notably higher than any of the surrounding upland areas. The site includes the summit and slopes above 250 m which have not yet been afforested. Peregrine Falcon, an Annex I species breeds within the site. Red Grouse occur amongst the tall heather east of the summit	Sourced from NPWS Conservation Objectives: Keeper Hill SAC 001197. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. [Version dated 17/10/2017]	
7	Silvermine Mountain SAC (000939)	Species-rich <i>Nardus</i> Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010)	Species-rich <i>Nardus</i> Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010)	This small site is situated on the northern slopes of the Silvermine Mountains, 1 km south-east of Silvermines village in Co. Tipperary. The geology of the area is sandstone of different ages - older Silurian on the central part of the mountain, while the outer parts are composed of yellowish and red sandstones of Devonian age.	Sourced from NPWS Conservation objectives for Silvermine Mountains SAC [000939]. Generic Version 6.0. Department of Arts, Heritage,	

European Site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source Last accessed online on 01/02/2019
8	Silvermine Mountain West SAC (002258)  Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010) European Dry Heath (4030) Calaminarian grasslands of the Violetalia calaminariae (6130)	The rare Small-white Orchid is also present on site and adds significantly to the value of the site.  This SAC is situated to the north of Keeper Hill, about 10 km south of Nenagh in Co. Tipperary. A ridge composed of Old Red Sandstone is visibly very prominent in the landscape when viewed from the Nenagh to Limerick road. The site is of conservation importance for its heath and grassland vegetation, and as a foraging area for Hen Harrier, and is one of the only extensive unplanted uplands remaining in north Tipperary.	Regional, Rural and Gaeltacht Affairs. [Version dated 05/07/2018]  Sourced from NPWS Conservation objectives for Silvermines Mountains West SAC [002258]. Version 1 Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 10/11/2017]
9	Philipston Marsh SAC (001847)  Transition mires and quaking bogs (7140)	This site is a small wetland and represents one of only two examples of calcareous fen and mire vegetation in the Mulkear River catchment.	Sourced from NPWS Conservation objectives for Philipston Marsh SAC [001847]. Version 1. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 12/01/2018]
10	Kilduff, Devilsbit Mountain SAC (000934)  Species-rich <i>Nardus</i> Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) European Dry Heaths (4030)	This upland site is situated approximately 6 km north-west of Templemore in Co. Tipperary. It comprises the summit of Devilsbit Mountain and much of the eastern side of the ridge which extends northwards to Kilduff Mountain. The rare and protected Small-white Orchid is also present on site and adds significantly to the value of the site.	Sourced from NPWS Conservation objectives for Kilduff, Devilsbit Mountain SAC [000934]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 05/07/2018]
11	Clare Glen SAC (000930)  (Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (91A0) (1421) Killarney Fern ( <i>Trichomanes speciosum</i> )	This SAC lies on the Limerick - Tipperary border, in the western foothills of the Slievefelim Mountains, about 10 km north-west of Cappamore. The glen was formed by the action of the Clare River cutting into the Old Red Sandstone. The site comprises the wooded river valley. The woodland, although planted with many exotic trees, is mature and conforms to a type listed on Annex II of the E.U. Habitats Directive. The presence of a number of rare and scarce species including bryophytes and fungi adds further to its importance.	Sourced from NPWS (2016) Site Synopsis for Clare Glen SAC [000930]. Generic Version 1. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 16/05/2018]

European Site Name and Code		Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source Last accessed online on 01/02/2019
12	Glenstal Wood SAC (001432)	Killarney Fern ( <i>Trichomanes speciosum</i> ) (1421)	This SAC lies in the western foothills of the Slievefelim Mountains, about 8 km north-west of Cappamore, Co. Limerick. The glen has been cut into Old Red Sandstone and runs in a north-easterly direction for about 2 km, eventually becoming a steep-sided rocky ravine	Sourced from NPWS <i>Conservation objectives for Glenstal Wood SAC [001432]. Version 1.</i> Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 15/05/2018]
13	Slieve Bernagh Bog SAC (002312)	Blanket Bogs (* if active bog) (7130) Northern Atlantic Wet Heath with <i>Erica tetralix</i> (4010) European Dry Heath (4030)	The Slieve Bernagh Bog is situated to the west of Lough Derg, Co. Clare. The site comprises the Slieve Bernagh mountain range, with the highest peaks at Moylussa (532 m) and Cragnamurragh (526 m), and the surrounding peatlands that flank its northern slopes.	Sourced from NPWS <i>Conservation Objectives: Slieve Bernagh Bog SAC 002312. Version 1.</i> National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 18/08/2016]
14	Lough Derg, North-East Shore SAC (002241)	Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae* (7210) Limestone Pavement* (8240) Alluvial Forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* (91E0) Yew Woodlands <i>Taxus baccata</i> woods of the British Isles* (91J0) Alkaline Fens (7230) Juniper Scrub - <i>Juniperus communis</i> formations on heaths or calcareous grasslands (5130)	Lough Derg, the lowest order lake on the River Shannon, is one of the largest bodies of freshwater in Ireland. The site includes the northern shore of the lake from the mouth of the Cappagh River in the north-west to just below Black Lough at the north-eastern shore. The greater part of this site lies on Carboniferous limestone.	Sourced from NPWS (2016) <i>Conservation objectives for Lough Derg, North-east Shore SAC [002241]. Generic Version 6.0.</i> Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [[Version dated 21/02/2018]
15	Glenomra Wood SAC (001013)	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (91A0)	Glenomra Wood is a deciduous semi-natural woodland located in south-east Co. Clare. The dominant tree is Downy Birch ( <i>Betula pubescens</i> ). This is mixed with Sessile Oak ( <i>Quercus</i>	Sourced from NPWS <i>Conservation objectives for Glenomra Wood SAC [001013]. Generic Version 6.0.</i> Department of Arts, Heritage, Regional, Rural and Gaeltacht

European Site Name and Code		Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source Last accessed online on 01/02/2019
16	Tory Hill SAC (000439)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) (6210) <i>Cladium</i> Fens - Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae* (7210) Alkaline Fens (7230)	<i>petraea</i> ), Ash ( <i>Fraxinus excelsior</i> ) and Beech ( <i>Fagus sylvatica</i> ) throughout.  Tory Hill is an isolated, wooded limestone hill situated about 2 km north-east of Croom, Co. Limerick. It is a prime example of a limestone hill set amongst a region of volcanic intrusions. The hill is of geomorphological interest for the end-moraine and for icemarks visible on the solid rock. The site includes Lough Nagirra and its associated wetland vegetation, located to the north and north-east of Tory Hill.	Affairs. [Version dated 16/06/2018]  Sourced from NPWS Conservation objectives for Tory Hill SAC [000439]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 03/08/2018]
17	Ratty River Cave SAC (002316)	Caves not open to the public (8310) Lesser Horseshoe Bat ( <i>Rhinolophus hipposideros</i> ) (1303)	This site includes a cave that is an annex I habitat and provides winter hibernation conditions for an internationally important number of Lesser Horseshoe Bat. There is also a summer roost for Lesser Horseshoe bats within this site.	Sourced from NPWS (2016) Conservation objectives for Ratty River Cave SAC [002316]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 30/07/2018]
18	Askeaton Fen Complex SAC (002279)	<i>Cladium</i> Fens - Calcareous fens with <i>Cladium mariscus</i> species of the Caricion davallianae* (7210) Alkaline Fens (7230)	Askeaton Fen Complex consists of a number of small fen areas to the east and southeast of Askeaton in Co. Limerick. This area has a number of undulating hills underlain by Lower Carboniferous Limestone. At the base of the hills a series of fens/reedbeds/loughs can be found, often in association with marl or peat deposits. At the south-east of Askeaton, both Cappagh and Ballymorisheen fens are surrounded by large cliff-like rocky limestone outcrops.	Sourced from NPWS Conservation objectives for Askeaton Fen Complex SAC [002279]. Version 1. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 18/05/2018]
19	Barrigone SAC (000432)	Orchid-rich Calcareous Grassland - Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)* (6210) Limestone Pavement* (8240)	This SAC is situated approximately 5 km west of Askeaton, Co. Limerick. The site comprises an area of dry, species-rich, calcareous grassland. The underlying limestone outcrops occasionally, and the proximity of the site to the Shannon Estuary adds a maritime influence. A range of scrub types are	Sourced from NPWS Conservation objectives for Barrigone SAC [000432]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht

European Site Name and Code		Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat		Summary Description (from Site Synopsis)		Data Source Last accessed online on 01/02/2019	
20	Curragh-chase Woods SAC (000174)	Juniper Scrub- formations on heaths or grasslands (5130) (1065) Marsh Fritillary ( <i>Euphydryas aurinia</i> )	Juniper <i>Juniperus communis</i> formations on heaths or calcareous grasslands (5130) (1065) Marsh Fritillary ( <i>Euphydryas aurinia</i> )	present including Juniper Scrub. A number of factors, including substrate, bedrock, microclimate and maritime influence, contribute to the floristic richness at Barrigone. The presence of rare species of plant and invertebrate highlight the site's conservation value.	Affairs. [Version dated 21/02/2018]	Sourced from NPWS Conservation Objectives for Curraghchase Woods SAC [000174]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 30/07/2018]	
21	Lough Derg (Shannon) SPA (004058)	Alluvial Forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* (91E0) Yew Woodlands <i>Taxus baccata</i> woods of the British Isles* (91J0) Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i> (1303)	Juniper <i>Juniperus communis</i> formations on heaths or calcareous grasslands (5130) (1065) Marsh Fritillary ( <i>Euphydryas aurinia</i> )	This site is situated approximately 7 km east of Askeaton in Co. Limerick. The area is characterised by glacial drift deposits over Carboniferous limestone. The site consists of mixed woodland and a series of wetlands. The site provides hibernation opportunities and foraging habitat for Lesser Horseshoe bat.	Affairs. [Version dated 21/02/2018]	Sourced from NPWS Conservation Objectives for Lough Derg (Shannon) SPA [004058]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 21/02/2018]	
22	River Shannon and River Fergus Estuaries SPA (004077)	Cormorant ( <i>Phalacrocorax carbo</i> ) (A017) Whooper Swan ( <i>Cygnus cygnus</i> ) (A038) Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> ) (A046) Shelduck ( <i>Tadorna tadorna</i> ) (A048) Wigeon ( <i>Anas penelope</i> ) (A050)	Juniper <i>Juniperus communis</i> formations on heaths or calcareous grasslands (5130) (1065) Marsh Fritillary ( <i>Euphydryas aurinia</i> )	Lough Derg lies within counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes. The greater part of the lake lies on Carboniferous limestone while the narrow southern section is underlain by Silurian strata. The site is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it has nationally important populations of Tufted Duck and Goldeneye. The annex I species Whooper Swan, Greenland White-fronted Goose, Hen Harrier and Common Tern have also been recorded on site.	Affairs. [Version dated 21/02/2018]	Sourced from NPWS Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and	

European Site Name and Code	Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat	Summary Description (from Site Synopsis)	Data Source Last accessed online on 01/02/2019
	<p>Teal (<i>Anas crecca</i>) (A052)                      Pintail (<i>Anas acuta</i>) (A054)                      Shoveler (<i>Anas clypeata</i>) (A056)                      Scaup (<i>Aythya marila</i>) (A062)                      Ringed Plover (<i>Charadrius hiaticula</i>) (A137)                      Golden Plover (<i>Pluvialis apricaria</i>) (A140)                      Grey Plover (<i>Pluvialis squatarola</i>) (A141)                      Lapwing (<i>Vanellus vanellus</i>) (A142)                      Knot (<i>Calidris canutus</i>) (A143)                      Dunlin (<i>Calidris alpina</i>) (A149)                      Black-tailed Godwit (<i>Limosa limosa</i>) (A156)                      Bar-tailed Godwit (<i>Limosa lapponica</i>) (A157)                      Curlew (<i>Numenius arquata</i>) (A160)                      Redshank (<i>Tringa totanus</i>) (A162)                      Greenshank (<i>Tringa nebularia</i>) (A164)                      Black-headed Gull (<i>Chroicocephalus ridibundus</i>) (A179)                      Wetland and Waterbirds (A999)</p>	<p>important populations of four species; Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. Furthermore 17 species have wintering populations of national importance. The site holds a nationally important breeding population of Cormorant. Three annex I species are listed regularly; Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.</p>	<p>the Gaeltacht. [Version dated 17/09/2012]</p>
<p>23</p> <p>Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)</p>	<p>Hen Harrier (<i>Circus cyaneus</i>) (A082)</p>	<p>This is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The mountains; Knockfeha, Mount Eagle, Knockanefune, Garraunbaun, Taur, Rock Hill, Knockacummer, Mullaghmuish, Knight's Mt, Ballincollig Hill, Beennageeha Mt, Sugar Hill, Knockanimpuba and Knockathea, amongst others are included in this site. Many rivers rise within the site, notably the Blackwater, Owentaragin, Owenkeal, Glenlara, Feale, Clydagh, Allaghoun, Allow, Oolagh, Galey and Smerlagh. The site is of ornithological importance because it provides nesting and foraging habitat for breeding Hen Harrier. The annex I species Merlin and Short-eared Owl have also been recorded on site.</p>	<p>Sourced from NPWS Conservation Objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]. Generic Version 6.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 21/02/2018]</p>

### 3.6 Sources of Information & Consultation

#### 3.6.1 Consultation

Consultation (including in relation to scoping) with statutory consultees and other relevant bodies between August 2015 and January 2019. Consultees included the Developments Application Unit (the Manager), National Parks & Wildlife Services (Dr. Jervis Good) and Inland Fisheries Ireland (Michael Fitzsimmons and Frank O’Donoghue). Consultation with these statutory bodies, including the information provided and feedback received, is summarised in Table 3:

**Table 3: Consultation with Statutory Bodies**

06/06/17	DAU NPWS IFI BWI BCI	Scoping document outlining up-to-date project amendments, ecological surveys to date, a brief synopsis of ecological survey results to date, in addition to an overview of potential impacts resulting from the proposed project.
27/7/2017	NPWS	Watercourse crossings, biosecurity, marsh fritillary, forestry felling and replanting as well as proposed mitigation measures for bats and hen harrier.
23/8/2017	IFI	Conference Call between Mr. Howard Williams, Mr. C. Cullen (INIS) and Mr Michael Fitzsimmons (IFI) in respect of watercourse evaluations in terms of fisheries importance and proposed crossing methods. Further to the call Mr. Fitzsimmons confirmed via email that a review and discussion of proposed crossings had taken place. Mr. Fitzsimmons also confirmed that the proposed crossing methodologies are in line with the methodologies discussed during the scoping inspection carried out with Howard Williams.
27/08/17	NPWS	Information meeting between Dr. Jervis Good (NPWS, Divisional Ecologist), and Mr. Howard Williams (INIS). This meeting provided an update of the project for NPWS staff and a discussion on each receptor within the project study area.
13/12/2017	NPWS	Project Overview. Final formal meeting with NPWS. Attendees were Mr Pat Foley (NPWS Deputy Regional Manager), Ms Julie Brett (Ecopower) and Mr Howard Williams and Chris Cullen (Inis). Mr Williams gave a full project overview to Mr Foley. Mr Foley acknowledged this and stated that he would pass on any pertinent details to Dr Good.



### 3.6.2 Sources of Information

In addition to consultation with NPWS and IFI, other sources of Information, which were considered during this Screening evaluation, included both desktop studies and fieldwork:

- Review of the Conservations Objectives, Site Synopsis and Site boundary information for the European Sites within with study area;
- Review of location and layout mapping for the UWF Related Works project;
- Review of the detailed description of the UWF Related Works project, including construction methodologies;
- The supporting ecological receptor information described in full in the Biodiversity Chapters (Chapter 8) of the UWF Related Works Revised EIA Report (January 2019).
- Information on the Environmental Protection Project Design Measures and Best Practice Survey Methods used to inform the Biodiversity evaluation (considered at Stage 2 of this Appropriate Assessment process)
- In addition Environmental Management Plans for UWF Related Works, along with
- Site visits and field works surveys for the UWF Related Works site, and
- Supporting survey information from the Upperchurch Windfarm (2012 to 2017) and from the previous (since refused) UWF Grid Connection (2016/2017).

## 3.7 Potential Sources and Pathways for Effects to European Sites (SACs and SPAs)

### 3.7.1 Sources of Effects to the 19 SACs from UWF Related Works

#### 3.7.1.1 Direct Habitat Loss, Fragmentation or Disturbance Effects

**Sources:** landcover change, movement of soils and machinery; earthworks, excavations, storage of overburden; use of fuels, chemicals, cement based compounds; tree felling, vegetation clearance.

**Pathway:** land cover, soils, water flowpaths

**Potential Impacts:** These sources could remove, disturb or fragment habitats, reduce habitat connectivity within an SAC, or reduce aquatic habitat quality through sediment/contaminant/nutrient laden runoff.

#### 3.7.1.2 Indirect terrestrial or aquatic habitat loss or degradation

**Sources (all outside SAC boundaries):** Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brush storage.

**Pathway:** water runoff flowpaths, watercourses, air

**Potential Impacts:** These sources could reduce water quality or habitat quality in downstream hydrologically connected SAC European Sites through sediment/contaminant/nutrient laden runoff or through the spread of invasive species, which could in-turn, cause indirect habitat loss or degradation effects to Qualifying Interests. The UWF Related Works is located in the Clodiagh River and Multeen River catchments in the Lower River Suir catchment area, and within the Bilboa River catchment in the Lower River Shannon catchment area. European Sites would have to be located downstream within one of these catchments or within a hydrologically connected downstream catchment. Effects to habitats within close proximity also have potential for degradation effects through the spread of invasive species.

**Timing of Impacts:** The potential for effects mainly relates to the construction stage, when the vast majority of any excavations or use of machinery will take place. Once constructed, the UWF Related Works project will require minimal maintenance, generally involving visual inspections of underground cabling, realigned roads and haul route locations. Should large turbine components need to be changed on Upperchurch Windfarm, some of the Haul Route Works locations may need to be re-opened to facilitate the transportation of the turbine component. Transport of turbine components could also occur during decommissioning of the Upperchurch Windfarm. Therefore the sources for the impacts (listed above) on European Sites could occur, albeit infrequently, during the operational and decommissioning stages.

#### 3.7.1.3 Indirect or Ex-Situ disturbance or displacement effects to Animal species of Qualifying Interest

**Sources (all outside SAC boundaries):** Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, watercourses.

**Pathway:** land cover, contact, air, visibility

**Potential Impacts:** These sources could cause disturbance or displacement effects to species of Qualifying Interests such as Otter or fisheries in SAC European Sites.

**Timing of Impacts:** As outlined at 2.6.1.2 above, effects are mainly associated with the construction stage of UWF Related Works, but may also occur (albeit infrequently) during the operational stage, and decommissioning stage, of the project.

### 3.7.2 Sources of Effects to the 4 SPAs from UWF Related Works

#### 3.7.2.1 Direct Habitat Loss, Fragmentation or Disturbance Effects

**Sources:** landcover change, movement of soils and machinery; earthworks, excavations, storage of overburden; use of fuels, chemicals, cement based compounds; tree felling, vegetation clearance.

**Pathway:** land cover, soils, water flowpaths.

**Potential Impacts:** These sources could remove, disturb or fragment habitats, reduce habitat connectivity within an SPA, or reduce aquatic habitat quality through sediment/contaminant/nutrient laden runoff.

#### 3.7.2.2 Indirect terrestrial or aquatic habitat loss, reduction or degradation

**Sources (all outside SPA boundaries):** landuse change; vegetation clearance, forestry felling; brash storage; earthworks, excavations, storage of overburden; movement of machinery, use of fuels, chemicals, cement based compounds; dewatering of excavations.

**Pathway:** land cover, water runoff flowpaths, watercourses, air.

**Potential Impacts:** These sources could reduce water quality or habitat quality in downstream hydrologically connected SPA European Sites through sediment/contaminant/nutrient laden runoff or through the spread of invasive species, which could in-turn, cause indirect habitat loss or degradation effects to bird species of Special Conservation Interest. The UWF Related Works is located in the Clodiagh River and Multeen River catchments in the Lower River Suir catchment area, and within the Bilboa River catchment in the Lower River Shannon catchment area. European Sites would have to be located downstream within one of these catchments or within a hydrologically connected downstream catchment. Effects to habitats within close proximity also have potential for degradation effects through the spread of invasive species.

**Timing of Impacts:** The potential for effects mainly relates to the construction stage, when the vast majority of any excavations or use of machinery will take place. Once constructed, the UWF Related Works project will require minimal maintenance, generally involving visual inspections of underground cabling, realigned roads and haul route locations. Should large turbine components need to be changed on Upperchurch Windfarm, some of the Haul Route Works locations may need to be re-opened to facilitate the transportation of the turbine component. Transport of turbine components could also occur during decommissioning of the Upperchurch Windfarm. Therefore the sources for the impacts (listed above) on European Sites could occur, albeit infrequently, during the operational and decommissioning stages.

#### 3.7.2.3 Indirect or Ex-Situ disturbance/ displacement effects to Special Conservation Interest bird species

**Sources (all outside SPA boundaries):** Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, suitable ex-situ habitats.

**Pathway:** land cover, contact, air, visibility

**Potential Impacts:** These sources could cause disturbance or displacement effects to bird species of Special Conservation Interests of the SPA sites.

**Timing of Impacts:** As outlined at 2.6.2.2 above, effects are mainly associated with the construction stage of UWF Related Works, but may also occur (albeit infrequently) during the operational stage, and decommissioning stage, of the project.

### 3.8 Initial Screening of 23 European Sites

An initial screening is carried out below, to determine which European Sites can be excluded from further consideration because UWF Related Works cannot have any impact on the Site or with the Qualifying Interests or Special Conservation Interests of the European Sites.

#### 3.8.1 Initial Screening of the 19 SACs

**Table 4: Initial Screening of the Potential for UWF Related Works to cause any effect to the 19 SAC Sites**

	European Site	Separation Distance to UWF Related Works	Hydrological Connection – Yes/No	Evaluation of potential for UWF Related Works to cause any of the following effects to the 19 SAC Sites: 1. Direct Habitat Loss, Fragmentation or Disturbance, 2. Indirect terrestrial or aquatic habitat loss or degradation, 3. Indirect/Ex-Situ disturbance or displacement of animal species
2	Lower River Shannon SAC (002165)	1.5 km	YES	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of the Lower River Shannon SAC site.</p> <p><b>2. YES, Screened In – There is potential for indirect habitat degradation effects in the downstream SAC</b> due to connectivity of watercourses within UWF Related Works site to the SAC.</p> <p><b>3. Yes Screened in – There is potential for indirect or ex-situ disturbance or displacement effects</b> to Otter and Fisheries due to hydrological connectivity and proximity.</p>
3	Lower River Suir SAC (002137)	3.0 km	YES	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of the Lower River Suir SAC site.</p> <p><b>2. YES, Screened In – There is potential for indirect habitat degradation effects in the downstream SAC</b> due to connectivity of watercourses within UWF Related Works site to the SAC.</p> <p><b>3. Yes Screened in – There is potential for indirect or ex-situ disturbance or displacement effects</b> to Otter and Fisheries due to hydrological connectivity and proximity.</p>
4	Anglesey Road SAC (002125)	2.9 km	No	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.</p> <p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Anglesey Road SAC.</p> <p><b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.</p>

	European Site	Separation Distance to UWF Related Works	Hydrological Connection – Yes/No	<b>Evaluation of potential for UWF Related Works to cause any of the following effects to the 19 SAC Sites:</b> 1. Direct Habitat Loss, Fragmentation or Disturbance, 2. Indirect terrestrial or aquatic habitat loss or degradation, 3. Indirect/Ex-Situ disturbance or displacement of animal species
5	Bolingbrook Hill SAC (002124)	7.2 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Bolingbrook Hill SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
6	Keeper Hill SAC (001197)	10.9 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Keeper Hill SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
7	Silvermine Mountain SAC (000939)	11.5 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and the Silvermine Mountain SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
8	Silvermine Mountain West SAC (002258)	12.5 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and the Silvermine Mountain West SAC.

	European Site	Separation Distance to UWF Related Works	Hydrological Connection – Yes/No	<b>Evaluation of potential for UWF Related Works to cause any of the following effects to the 19 SAC Sites:</b> 1. Direct Habitat Loss, Fragmentation or Disturbance, 2. Indirect terrestrial or aquatic habitat loss or degradation, 3. Indirect/Ex-Situ disturbance or displacement of animal species
				<b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
9	Philipston Marsh SAC (001847)	13.0 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Philipston Marsh SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
10	Kilduff, Devilsbit Mountain SAC (000934)	13.7 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and the Kilduff, Devilsbit Mountain SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
11	Clare Glen SAC (000930)	17.0 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and the Clare Glen SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
12	Glenstal Wood SAC (001432)	17.1 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological

	European Site	Separation Distance to UWF Related Works	Hydrological Connection – Yes/No	<b>Evaluation of potential for UWF Related Works to cause any of the following effects to the 19 SAC Sites:</b> 1. Direct Habitat Loss, Fragmentation or Disturbance, 2. Indirect terrestrial or aquatic habitat loss or degradation, 3. Indirect/Ex-Situ disturbance or displacement of animal species
				connectivity and the separation distance between construction works, or any operational stage work, and Glenstal Wood SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
13	Slieve Bernagh Bog SAC (002312)	28.4 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Slieve Bernagh Bog SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
14	Lough Derg, North-East Shore SAC (002241)	28.5 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Lough Derg, North-East Shore SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
15	Glenomra Wood SAC (001013)	31.4 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Glenomra Wood SAC. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.
16	Tory Hill SAC (000439)	40.4 km	No	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.

	European Site	Separation Distance to UWF Related Works	Hydrological Connection – Yes/No	<p><b>Evaluation of potential for UWF Related Works to cause any of the following effects to the 19 SAC Sites:</b></p> <p>1. Direct Habitat Loss, Fragmentation or Disturbance,                  2. Indirect terrestrial or aquatic habitat loss or degradation,                  3. Indirect/Ex-Situ disturbance or displacement of animal species</p>
				<p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Tory Hill SAC.</p> <p><b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.</p>
17	Ratty River Cave SAC (002316)	44.5 km		<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.</p> <p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Ratty River Cave SAC.</p> <p><b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> to Qualifying Interest (Lesser Horseshoe Bat) due to separation distance between UWF Related Works and Ratty River Cave SAC.</p>
18	Askeaton Fen Complex SAC (002279)	48.2 km	No	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.</p> <p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and the Askeaton Fen Complex SAC.</p> <p><b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> as Qualifying Interest only relate to habitats and plant species.</p>
19	Barrigone SAC (000432)	62.0 km	No	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.</p> <p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and the Barrigone SAC.</p> <p><b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> to Qualifying Interest (Marsh Fritillary) due to separation distance between UWF Related Works and Barrigone SAC.</p>



	European Site	Separation Distance to UWF Related Works	Hydrological Connection – Yes/No	<b>Evaluation of potential for UWF Related Works to cause any of the following effects to the 19 SAC Sites:</b> 1. Direct Habitat Loss, Fragmentation or Disturbance, 2. Indirect terrestrial or aquatic habitat loss or degradation, 3. Indirect/Ex-Situ disturbance or displacement of animal species
20	Curraghchase Woods SAC (000174)	50.6 km	No	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.</p> <p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and the Curraghchase Woods SAC.</p> <p><b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> to Qualifying Interest (Lesser Horseshoe Bat) due to separation distance between UWF Related Works and Curraghchase Woods SAC.</p>

3.8.2 Initial Screening of the 4 SPAs

Table 5: Initial Screening of the Potential for UWF Related Works to cause any effect to the 4 SPA Sites

	European Site	Distance from UWF Related Works	Evaluation of potential for UWF Related Works to cause any of the following effects to the 4 SPA Sites: 1. Direct Habitat Loss, Fragmentation or Disturbance 2. Indirect terrestrial or aquatic habitat loss, reduction or degradation 3. Indirect or Ex-Situ disturbance or displacement effect of birds
1	Slievefelim to Silvermines Mountain SPA (004165)	1.5 km	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> – A very small part of the UWF Related Works (0.05ha) Site Boundary (Planning Red Line) overlaps the Slieve Felim to Silvermines Mountain SPA.</p> <p>The construction works boundary is outside the boundary of the Silvermines to Slieve Felim SPA. <b>No works, no groundworks and no vegetation clearance will take place within the SPA boundary,</b> and therefore there will be <b>no habitat loss or fragmentation effects to the Slieve Felim to Silvermines Mountain SPA</b> as a result of the UWF Related Works project.</p> <p><b>2. YES, Screened In – There is potential for indirect habitat loss or reduction effects</b> to Special Conservation Interest (Hen harrier) due to proximity (&lt;2km) to SPA boundary.</p> <p><b>3. Yes Screened in – There is potential for indirect or ex-situ disturbance or displacement effects</b> to Special Conservation Interest (Hen harrier) due to proximity (&lt;2km) to SPA boundary.</p>
21	Lough Derg (Shannon) SPA (004058)	24.5 km	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.</p> <p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> to Special Conservation Interests (Cormorant, Tufted Duck, Goldeneye, Common Tern, or Wetland and Waterbirds) due to the absence of hydrological connectivity and the separation distance between construction works, or any operational stage work, and Lough Derg (Shannon) SPA.</p> <p><b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> to Special Conservation Interests due to separation distance between UWF Related Works and Lough Derg (Shannon) SPA.</p>
22	River Shannon and River Fergus Estuaries SPA (004077)	34.5 km	<p><b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site.</p> <p><b>2: No, Screened Out - No potential for indirect habitat degradation effects</b> to Special Conservation Interests (Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Knot, Ringed Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Redshank, Greenshank, Black-headed Gull, Wetland and Waterbirds) due to the large downstream distance and dilution factors, and due to the separation distance between construction works, or any operational stage work, and River Shannon and River Fergus Estuaries SPA.</p>

	European Site	Distance from UWF Related Works	<b>Evaluation of potential for UWF Related Works to cause any of the following effects to the 4 SPA Sites:</b> 1. Direct Habitat Loss, Fragmentation or Disturbance 2. Indirect terrestrial or aquatic habitat loss, reduction or degradation 3. Indirect or Ex-Situ disturbance or displacement effect of birds
			<b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> to Special Conservation Interests due to separation distance between UWF Related Works and River Shannon and River Fergus Estuaries SPA.
23	Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)	67.3 km	<b>1: No, Screened Out - No potential for direct habitat loss, habitat degradation or disturbance effects</b> due to the location of UWF Related Works outside of this Site. <b>2: No, Screened Out - No potential for indirect habitat loss or reduction effects</b> to Special Conservation Interests (Hen Harrier) due to the separation distance between construction works, or any operational stage work, and Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA. <b>3: No, Screened Out - No potential for indirect or ex-situ disturbance or displacement effects</b> to Special Conservation Interests due to separation distance, and the absence of collision risk associated with UWF Related Works.

### 3.8.3 Findings of Initial Screening Exercise

UWF Related Works was examined to determine if this project, on its own, had *any potential* to cause any effects to 23 no. European Sites (19 SACs and 4 SPAs), which are located within the study area.

The results are that **is there is no *potential* for UWF Related Works to cause any effects to the following 20 no. European Sites (17 SACs, 3 SPAs):**

- Anglesey Road SAC (002125),
- Bolingbrook Hill SAC (002124),
- Keeper Hill SAC (001197),
- Silvermine Mountain SAC (000939),
- Silvermine Mountain West SAC (002258),
- Philipston Marsh SAC (001847),
- Kilduff, Devilsbit Mountain SAC (000934),
- Clare Glen SAC (000930),
- Glenstal Wood SAC (001432),
- Slieve Bernagh Bog SAC (002312),
- Lough Derg, North-East Shore SAC (002241),
- Glenomra Wood SAC (001013),
- Tory Hill SAC (000439),
- Ratty River Cave SAC (002316),
- Askeaton Fen Complex SAC (002279),
- Barrigone SAC (000432),
- Curraghchase Woods SAC (000174),
- Lough Derg (Shannon) SPA (004058),
- River Shannon and River Fergus Estuaries SPA (004077), and
- Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161).

UWF Related Works will not have any likelihood of significant effect, taking account of potential impact pathways, on the Qualifying Interests and Special Conservation Interests of these European Sites. It is considered that UWF Related Works does not have any potential to cause significant impacts to these Sites or to further cause significant in-combination effects with other projects, and therefore these Sites are excluded from further consideration.

The results are also that **there is *potential* for UWF Related Works to cause effects to 3 no. European Sites:**

- **Lower River Shannon SAC,**
- **Lower River Suir SAC, and**
- **Slievefelim to Silvermines Mountain SPA.**

The Qualifying Interests and Special Conservation Interests of these 3 no. European sites are now screened further, in Section 2.9 below.

**3.9 Further Screening of 3 European Sites**

Following the initial screening, 3 European sites (Lower River Shannon SAC, Lower River Suir SAC, and Slieve Felim to Silvermines Mountain SPA) are brought forward for further detailed screening, to establish whether or not impact pathways or interactions exist between UWF Related Works and the Qualifying Interests or Special Conservation Interests of the three Sites.

**Table 6: European Sites brought forward for further screening of Qualifying Interests or Special conservation Interests**

European Site	Effects to European Sites evaluated in further detail in the Screening Evaluation (Section 2.9.4)
<b>Lower River Shannon SAC</b>	<ul style="list-style-type: none"> <li>• indirect habitat degradation effects in the downstream SAC</li> <li>• indirect or ex-situ disturbance or displacement effects</li> </ul>
<b>Lower River Suir SAC</b>	<ul style="list-style-type: none"> <li>• indirect habitat degradation effects in the downstream SAC</li> <li>• indirect or ex-situ disturbance or displacement effects</li> </ul>
<b>Slieve Felim to Silvermines Mountain SPA</b>	<ul style="list-style-type: none"> <li>• indirect habitat loss or reduction effects</li> <li>• indirect or ex-situ disturbance or displacement effects</li> </ul>

### 3.9.1 Lower River Shannon SAC

The Lower River Shannon SAC is a very large site, which stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head. The site encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head.

Rivers within the sub-catchment of the Feale include the Galea, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarne. **Rivers within the sub-catchment of the Mulkear include the** Killeenagarraff, Annagh, Newport, the Dead River, the **Bilboa** (*authors emphasis*), Glashacloonaraveela, Gortnageragh and Cahernahallia.

This site contains the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. This site supports more wintering wildfowl and waders than any other site in the country and supports a large number of migratory birds.

#### 3.9.1.1 Screening of the Potential for UWF Related Works to cause effects to Qualifying Interests of the Lower River Shannon SAC

The potential for impact pathways between UWF Related Works and the Qualifying Interests of the Lower River Shannon SAC are examined in the table below. In summary, the findings are that there are potential impact pathways to the following Qualifying Interests:

- Water courses of plain to montane levels with the Ranunculus fluitans and Callitriche-Batrachium vegetation [3260]
- Atlantic Salmon [1106]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Otter [1355]

**The above listed Qualifying Interests are brought forward for Stage 2 Appropriate Assessment.**

All of the other Qualifying Interests are screened out from further evaluation since there is no potential for UWF Related Works to cause any effect to these Qualifying Interests. Because UWF Related Works has no potential to cause effects, it also has no potential for in-combination effects with other projects.

**Table 7: Screening of the Potential for UWF Related Works to cause effects to the Qualifying Interests of the Lower River Shannon SAC**

Lower River Shannon SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in combination) at the bottom of this table. If No – Screened out
<p>Sandbanks which are slightly covered by sea water all the time [1110]                      Estuaries (1130)                      Mudflats and Sandflats not covered by seawater all the time (1140)                      Coastal Lagoons (1150) (<i>*priority habitat</i>)                      Large shallow inlets and bays (1160)                      Reefs (1170)  <i>Salicornia</i> and other annuals colonizing mud and sand [1310]                      Atlantic Salt Meadows (1330)                      Mediterranean Salt Meadows (1410)</p>	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p>	<p>water runoff flowpaths, watercourses, air</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p>	<p><b>No impact pathway</b> - While the UWF Related Works is located upstream of these habitats, the Qualifying Interests are in coastal or transitional waters located to the west of Limerick City, and combined with a separation distance of 67.5km downstream it is evaluated that no impact pathway exists.</p>	<p><b>Screened Out - UWF Related Works</b> has no likelihood of causing effects to these habitats based on separation distance, the limited footprint of works the substantial dilution and dispersion within the sub-catchment, and the location of these Qualifying Interests in coastal or transitional waters.</p>
<p>Perennial Vegetation of Stony Banks (1220)                      Vegetated Sea Cliffs (1230)</p>	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p>	<p>water runoff flowpaths, watercourses, air</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p>	<p>No hydrological connectivity – these habitats are coastal habitats. Sea cliffs are recorded from the south coast of the Loop Head peninsula and north coast of Kerry at Ballybunion/Kerry Head.</p>	<p><b>Screened Out - UWF Related Works</b> has no potential of causing effects to these habitats due to the absence of impact pathways with these habitats.</p>

Lower River Shannon SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
<p><i>Molinia</i> Meadows [6410]</p>	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p>	<p>water runoff flowpaths, watercourses, air</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p>	<p>The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, <i>Molinia</i> meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy.</p> <p>This habitat type was not recorded within 50m of watercourses on the UWF Related Works project site.</p>	<p><b>Screened Out - UWF Related Works</b> has no likelihood of causing effects to these habitats due to the absence of this habitat in proximity to UWF Related Windfarm works.</p>
<p>Alluvial Forests (91E0) * (* <i>priority habitat</i>)</p>	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p>	<p>water runoff flowpaths, watercourses, air</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p>	<p>No hydrological connectivity with mapped boundaries of Alluvial forests in the Lower River Shannon SAC,</p> <p>Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick.</p> <p>The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north-east of Cappamore, support patches of semi-natural</p>	<p><b>Screened Out - UWF Related Works</b> has no likelihood of causing effects to these habitats due to the absence of impact pathways with these habitats, and the absence of woodland habitat at the UWF Related Works site.</p>



Lower River Shannon SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
Freshwater Pearl Mussel [1029]	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage	water runoff flowpaths, watercourses, air	Indirect terrestrial or aquatic habitat loss or degradation	broadleaf woodland dominated by Ash, Hazel, oak and birch.  No hydrological connectivity: The cited Qualifying Interest population is in the Cloon River in County Clare, to the north of the River Shannon Estuary	<b>Screened Out - UWF Related Works has no likelihood of causing effects to these habitats due to the absence of impact pathways to this Qualifying Interest.</b>
Bottlenose Dolphin [1349]	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage  Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, watercourses	water runoff flowpaths, watercourses, air  land cover, contact, air, visibility	Indirect terrestrial or aquatic habitat loss or degradation  Indirect or Ex-Situ disturbance or displacement effects	No impact pathway – dolphin occur in estuary habitat at a large separation distance downstream of UWF Related Works site. There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary, west of Limerick	<b>Screened Out - UWF Related Works has no likelihood of causing effects to these habitats due to the absence of impact pathways with these habitats, and separation distance.</b>

Lower River Shannon SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
<p>Water courses of plain to montane levels with the Ranunculus fluitans and Callitriche-Batrachion vegetation [3260]</p>	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p>	<p>water runoff flowpaths, watercourses, air</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p>	<p>A rich bryophyte flora has been recorded from the Bilboa River, Mulkear catchment, including the vulnerable. The bryophyte-rich habitat was found in mature river stretches of 10-12 m, occasionally up to 20 m, wide, which varied from riffles and cascades to pools. The nearest point of mapped bryophyte rich stream and river sub-type is 7km downstream of UWF Related Works.</p>	<p>Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2</p>
<p>Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099]</p>	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage  Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, watercourses</p>	<p>water runoff flowpaths, watercourses, air  land cover, contact, air, visibility</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation  Indirect or Ex-Situ disturbance or displacement effects</p>	<p>Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the Lower River Shannon SAC. These are Sea Lamprey, Brook Lamprey, River Lamprey, Twaité Shad and Salmon. The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. Twaité Shad is not thought to spawn within the site. There is hydrological connectivity to the lower River Shannon via the Bilboa River.</p>	<p>Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2</p>

Lower River Shannon SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
Otter [1355]	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p> <p>Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, watercourses</p>	<p>water runoff flowpaths, watercourses, air</p> <p>land cover, contact, air, visibility</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p> <p>Indirect or Ex-Situ disturbance or displacement effects</p>	<p>Otter is commonly found in the SAC and could be present in larger downstream watercourses.</p> <p>There is hydrological connectivity to the lower River Shannon via the Bilboa River.</p>	<p><b>Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2</b></p>

### 3.9.2 Lower River Suir SAC (002137)

Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, **Multeen and Clodiagh in Co. Tipperary** (*authors emphasis*). The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford.

#### 3.9.2.1 Screening of the Potential for UWF Related Works to cause effects to Qualifying Interests of the Lower River Suir SAC

The potential for impact pathways between UWF Related Works and the Qualifying Interests of the Lower River Suir SAC are examined in the table below. In summary, the findings are that there are potential impact pathways to the following Qualifying Interests:

- Alluvial Forests (91E0)\* (priority habitat)
- *Taxus baccata* woods of the British Isles [91J0]
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitriche-Batrachion* vegetation [3260]
- Freshwater Pearl Mussel [1029]
- White-clawed Crayfish [1092]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Atlantic Salmon [1106]
- Otter [1355]

The above listed Qualifying Interests are brought forward for Stage 2 Appropriate Assessment.

All of the other Qualifying Interests are screened out from further evaluation as there is no potential for UWF Related Works to cause any effect to these Qualifying Interests, either alone, or in-combination with other projects..

**Table 8: Screening of the Potential for UWF Related Works to cause effects to the Qualifying Interests of the Lower River Suir SAC (002137)**

Lower River Suir SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
Atlantic salt meadows [1330] Mediterranean salt meadows [1410]	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage	water runoff flowpaths, watercourses, air	Indirect terrestrial or aquatic habitat loss or degradation	No impact pathway - the UWF Related Works is located at a substantial distance (>130 river kilometres) upstream of these habitats.	<b>Screened Out - UWF Related</b> Works has no likelihood of causing effects to these habitats based on separation distance and the substantial dilution and dispersion within the sub-catchment.
Alluvial Forests (91E0)* (* priority habitat) <i>Taxus baccata</i> woods of the British Isles [91J0] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage	water runoff flowpaths, watercourses, air	Indirect terrestrial or aquatic habitat loss or degradation	The potential for hydrological connection exists.  Alluvial woodlands within the SAC occur at significant distances (<.130 river kilometres) downstream; as do Old Sessile oak woods and Yew Woodlands. Hydrophilous tall herb fringe communities occur in association with alluvial woodlands.	<b>Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2</b>
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage	water runoff flowpaths, watercourses, air	Indirect terrestrial or aquatic habitat loss or degradation	No hydrological connection	<b>Screened Out - UWF Related</b> Works has no likelihood of causing effects to these habitats due to the absence of impact pathways with these habitats.
Twaiite Shad [1103]				No impact pathway: Twaiite Shad spawn in calm waters about 1km upstream of the old bridge in	<b>Screened Out - UWF Related</b> Works has no likelihood of causing effects to these habitats due to the absence of

Lower River Suir SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
Water courses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation [3260]	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage	water runoff flowpaths, watercourses, air	Indirect terrestrial or aquatic habitat loss or degradation	Carrick-on-Suir (>100km via hydrological links).	impact pathways with this species.
Freshwater Pearl Mussel [1029]	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage	water runoff flowpaths, watercourses, air	Indirect terrestrial or aquatic habitat loss or degradation	This Qualifying Interest can relate to lowland rivers or upland streams with floating or submerged vegetation and aquatic mosses. The potential for hydrological connection exists.	Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2
White-clawed Crayfish [1092]	Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based	water runoff flowpaths, watercourses, air	Indirect terrestrial or aquatic habitat loss or degradation	The potential for hydrological connection exists. The UWF Related Works are located approximately 17km upstream from the nearest FPM population in the Clodiagh (Tipperary). It is noted that neither the Clodiagh (Tipperary) nor the Multeen FPM populations are identified within the Lower River Suir SAC Conservation Objectives, which focus on the Clodiagh (Portlaw) population - No hydrological connectivity with the Clodiagh (Portlaw).	Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2.

Lower River Suir SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
<p>Sea Lamprey [1095]                      Brook Lamprey [1096]                      River Lamprey [1099]                      Atlantic Salmon [1106]</p>	<p>compounds; excavation dewatering; tree felling, brash storage</p> <p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p> <p>Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, watercourses</p>	<p>water runoff flowpaths, watercourses, air</p> <p>land cover, contact, air, visibility</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p> <p>Indirect or Ex-Situ disturbance or displacement effects</p>	<p>Crayfish population in the Clodiagh (Tipperary).</p> <p>The potential for hydrological connection exists via the watercourses at the UWF Related Works site.</p>	<p>Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2</p>
<p>Otter [1355]</p>	<p>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage</p> <p>Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from</p>	<p>water runoff flowpaths, watercourses, air</p> <p>land cover, contact, air, visibility</p>	<p>Indirect terrestrial or aquatic habitat loss or degradation</p>	<p>The potential for hydrological connection exists via the watercourses at the UWF Related Works site.</p>	<p>Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2</p>

Lower River Suir SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
	construction works and construction machinery; in, or in close proximity to, watercourses		Indirect or Ex-Situ disturbance or displacement effects		



**3.9.3 Slieve Felim to Silvermines Mountain SPA (004167)**

This SPA is an upland site located in Counties Tipperary and Limerick. It includes the peaks Keeper Hill, Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site is underlain mainly by sandstones of Silurian age. Several important rivers rise within the site, including the Mulkear, Bilboa and Clare. The Slievefelim to Silvermines SPA is of ornithological importance because it provides nesting and foraging habitat for breeding Hen Harrier. The annex I species Merlin and Peregrine have also been recorded on site.

**3.9.3.1 Screening of the Potential for UWF Related Works to cause effects to Special Conservation Interests of the Slieve Felim to Silvermines SPA**

The potential for impact pathways between UWF Related Works and the Special Conservation Interest of the Slieve Felim to Silvermines Mountain SPA was examined in the table below. In summary, the findings are that there are potential impact pathways to the following Special Conservation Interest:

- Hen Harrier

The above listed Special Conservation Interest is brought forward for Stage 2 Appropriate Assessment.

**Table 9: Screening of the Potential for UWF Related Works to cause effects to the Special Conservation Interests of the Slieve Felim to Silvermines Mountain SPA (004167)**

Lower River Shannon SAC Qualifying Interests (QI)	Potential Source(s) of Impacts	Possible Impact Pathway(s)	Potential Effect(s) On Qualifying Interests	Examination of Connectivity between UWF Related Works and Lower River Shannon SAC	Potential for effects? If Yes – examined for potential significant effects (alone and in-combination) at the bottom of this table. If No – Screened out
Hen Harrier ( <i>Circus cyaneus</i> ) [A082]	landuse change; vegetation clearance, forestry felling; brash storage; earthworks, excavations, storage of overburden; movement of machinery, use of fuels, chemicals, cement based compounds; dewatering of excavations.  Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, suitable ex-situ habitats	land cover, water runoff flowpaths, watercourses, air  land cover, contact, air, visibility	Indirect terrestrial or aquatic habitat loss or degradation  Indirect or Ex-Situ disturbance/displacement effects to Special Conservation Interest bird species	The potential for impact pathways exist due to proximity (<2km) to SPA boundary.	<b>Potential impact pathways exist – SCREENED IN for further evaluation at Stage 2</b>

### 3.10 Stage One Screening Conclusion

The Screening Evaluation provided herein has examined the potential for UWF Related Works to cause any effects via source pathway linkages on the designated SACs and SPAs within the extended study area.

#### 3.10.1 Results of the Initial Scoping of all 23 European Sites (17 SACs, 4 SPAs)

The results are that **is there is no potential for UWF Related Works to cause any effects to the following 20 no. European Sites (17 SACs, 3 SPAs):**

- Anglesey Road SAC (002125),
- Bolingbrook Hill SAC (002124),
- Keeper Hill SAC (001197),
- Silvermine Mountain SAC (000939),
- Silvermine Mountain West SAC (002258),
- Philipston Marsh SAC (001847),
- Kilduff, Devilsbit Mountain SAC (000934),
- Clare Glen SAC (000930),
- Glenstal Wood SAC (001432),
- Slieve Bernagh Bog SAC (002312),
- Lough Derg, North-East Shore SAC (002241),
- Glenomra Wood SAC (001013),
- Tory Hill SAC (000439),
- Ratty River Cave SAC (002316),
- Askeaton Fen Complex SAC (002279),
- Barrigone SAC (000432),
- Curraghchase Woods SAC (000174),
- Lough Derg (Shannon) SPA (004058),
- River Shannon and River Fergus Estuaries SPA (004077), and
- Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161).

Therefore, these EU sites have been 'Screened Out' at Stage One of the Appropriate Assessment process. In accordance of the recommendations of the Guidance Document '*Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*', (European Commission 2001), a Finding of No Significant Effects (FONSE) Report has been completed in respect of these European Sites and is included as Appendix A3.

**The results of the screening are also that UWF Related Works has potential, via impact pathways, to cause effects to the following 3 European Sites (2 SACs, 1 SPA;**

- **Lower River Shannon SAC**
- **Lower River Suir SAC, and**
- **Slieve Felim to Silvermines Mountain SPA**

As a result, there is an obligation on the Competent Authority to carry out an Appropriate Assessment (i.e. Stage Two of the AA process) under Article 6 (3) of the Habitats Directive for this project, and in this context a Stage 2 Appropriate Assessment Report has been completed.

**3.10.2 Results of Scoping of Qualifying Interests/Special Conservation Interest for 3 Sites**

The three European Sites; Lower River Shannon SAC, Lower River Suir SAC, and Slieve Felim to Silvermines Mountain SPA were further screened, to establish whether or not impact pathways or interactions exist between UWF Related Works and the Qualifying Interests or Special Conservation Interests of the three Sites.

The results of this screening is that the following Qualifying Interests/Special Conservation Interests can be excluded from further consideration as there is no potential for UWF Related Works to cause effects to these Qualifying Interests, see Table 10.

**Table 10: Qualifying Interest Screened Out due to no potential or likelihood of UWF Related Works causing any effects**

European Site	Qualifying Interest Screened Out due to no potential or likelihood of UWF Related Works causing any effects
Lower River Shannon SAC	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries (1130) Mudflats and Sandflats not covered by seawater all the time (1140) Coastal Lagoons (1150) ( <i>*priority habitat</i> ) Large shallow inlets and bays (1160) Reefs (1170) <i>Salicornia</i> and other annuals colonizing mud and sand [1310] Atlantic Salt Meadows (1330) Mediterranean Salt Meadows (1410) Perennial Vegetation of Stony Banks (1220) Vegetated Sea Cliffs (1230) <i>Molinia</i> Meadows [6410] Alluvial Forests (91E0)* Freshwater Pearl Mussel [1029] Bottlenose Dolphin [1349]
Lower River Suir SAC	Atlantic salt meadows [1330] Mediterranean salt meadows [1410] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles Twaite Shad [1103]
Slieve Felim to Silvermines Mountain SPA	No Special Conservation Interests screened out.

The result of this screening is also that the following Qualifying Interests and Special Conservation Interest has been screened in for further detailed evaluation at Stage Two of the Appropriate Assessment process. These Qualifying Interests and Special Conservation Interests are identified on Table 11.

**Table 11: Qualifying Interest Screened In due to potential for UWF Related Works to cause effects**

European Site	Qualifying Interest Screened In due to potential or likelihood of UWF Related Works causing effects
Lower River Shannon SAC	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260] Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]
Lower River Suir SAC	Alluvial Forests (91E0)* (priority habitat) <i>Taxus baccata</i> woods of the British Isles [91J0] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260] Freshwater Pearl Mussel [1029] White-clawed Crayfish [1092] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106] Otter [1355]
Slieve Felim to Silvermines Mountain SPA	Hen Harrier

**3.10.3 Screening Conclusion**

Following screening it can reasonably be concluded that **there is potential for significant effects to the Lower River Shannon SAC, Lower River Suir SAC and Slieve Felim to Silvermines Mountain SPA** as a result of the UWF Related Works project.

**Therefore, the Lower River Shannon SAC, Lower River Suir SAC and Slieve Felim to Silvermines Mountain SPA have been ‘Screened In’ for further evaluation at Stage Two of the Appropriate Assessment process.**

## **4 STAGE 2 – APPROPRIATE ASSESSMENT**

This section comprises a detailed appraisal of the impacts of the UWF Related Works project (either alone or in-combination with other projects or plans), on the integrity of 3 no. European Sites and is considered with respect to their conservation objectives and to their structure and function.

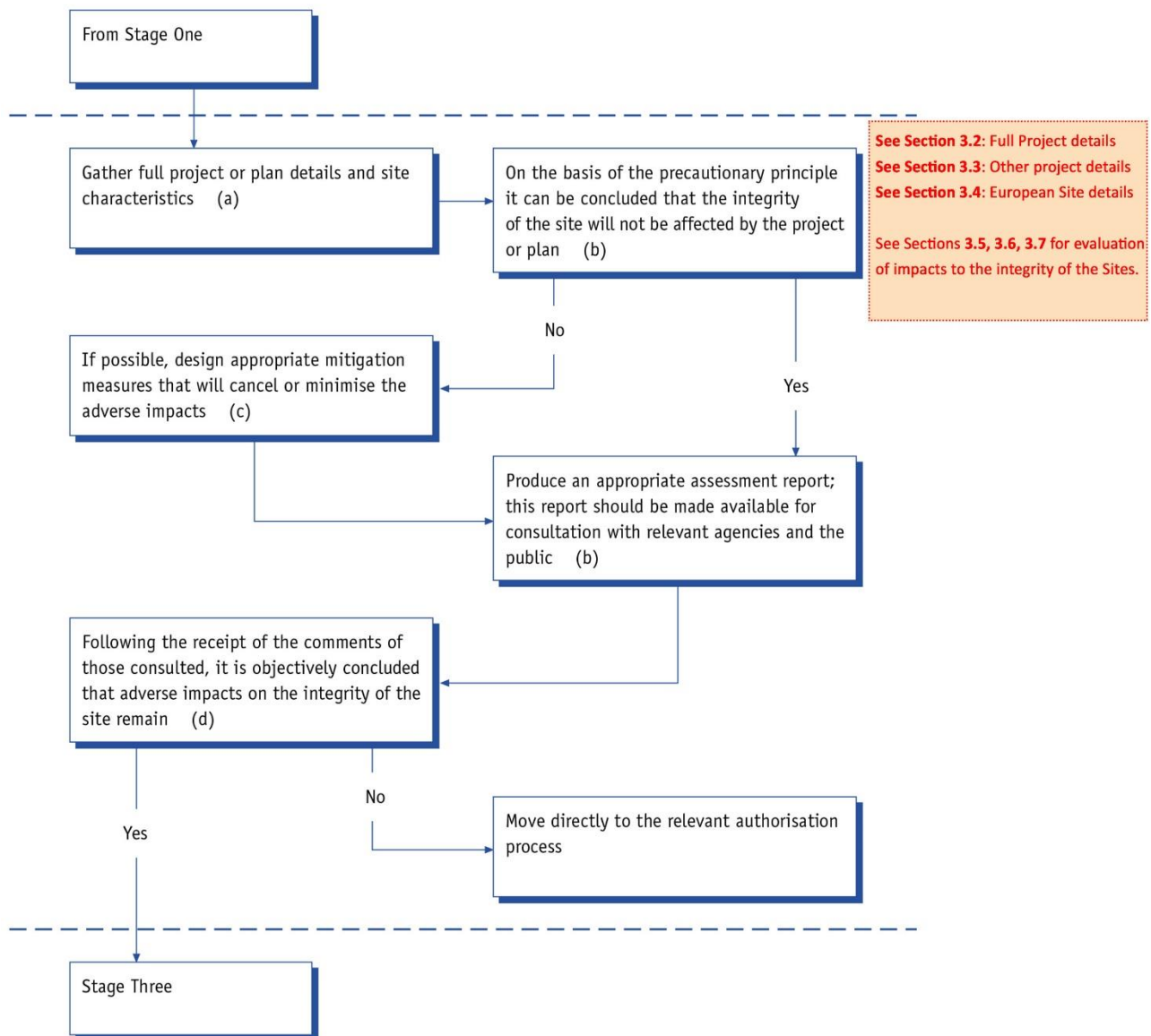
The 3 no. European Sites are as follows:

1. Lower River Shannon SAC (002165)
2. Lower River Suir SAC (002137)
3. Slievefelim to Silvermines SPA (004077)

## 4.1 Appropriate Assessment Evaluation Process

The Appropriate Assessment process considers of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the Site’s structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.

### Stage Two: Appropriate assessment



**Notes**

- (a) This may make use of information gathered in Stage One, although it will also require more detailed information (see Sections 3.2.2 and 3.2.3 below).
- (b) This assessment must be made on the basis of the precautionary principle (see Section 3.2.4 below).
- (c) It is for the competent authority to determine what mitigation measures will be required (see Section 3.2.5 below).
- (d) Make use of the checklist in Box 10 below.

**Stage Two outputs: Appropriate assessment: Mitigation measures (Figure 3)**  
**Appropriate assessment report (Figure 4)**

## 4.2 Description of UWF Related Works and of Other Projects considered for 'in-combination' effects

### 4.2.1 UWF Related Works - Location, Size, Scale, Landcover

The Internal Windfarm Cabling will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnaageha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. Approximately 62% of the Internal Windfarm Cabling is located under Consented UWF Roads or Realigned Windfarm Roads, the remaining Cabling is located in the vicinity of the windfarm site. The Internal Windfarm Cabling consists of electrical cables, communication cables and the copper conductor cables which are installed inside High Density Polyethylene (HDPE) ducting in underground trenches. Cable Protection and Warning Tapes will also be laid in the trench. The trench will be excavated, ducting and warning tapes installed and the trench backfilled and reinstated. When the ducting installation is finished and the trench reinstated the electrical, communication and copper conductor cables will then be pulled through the ducting. The only surface expression of the Internal Windfarm Cabling will be the over-ground identification marker posts and marker plates which will be installed at regular intervals above the cables trench.

The Realigned Windfarm Roads are two sections of the already consented windfarm roads which require realignment and one length of new road to link a telecoms mast to the windfarm road. These changes are proposed for windfarm roads in agricultural and forestry lands in the townlands of Shevry, Knockmaroe, and Grousehall, which are all within the Upperchurch Windfarm site.

The Haul Route Works are proposed for public road verges, roadside boundaries and grassland fields located adjacent to the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 and R503 roads in the following townlands: Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe and Grousehall. Works include the removal of soils and laying of crushed stone and hard-core in roadside verges; temporary removal or partremoval of roadside boundaries; opening of temporary entrances and the construction of temporary access roads on private lands.

The Telecom Relay Pole is an 18m wooden pole proposed for a location in Knockmaroe townland, close to the existing Foilnaman Mast. Laghtseefin Mast is 9.5km directly south. The Relay Pole will be contained within a small compound, and a low voltage power and communications supply will be provided from the existing Foilnaman Mast. A short length of access road, Realigned Windfarm Road No. RWR3, will provide access to the Telecom Relay Pole from the Consented UWF Road network.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include temporary access roads; temporary and permanent watercourse crossings; temporary site entrances; change of use from 'agriculture' to 'forestry and agriculture' at the UWF Replacement Forestry entrance at Foilnaman; along with forestry felling; temporary and permanent hedgerow/tree removal; permanent hedgerow replanting; fencing; relocation of existing telephone poles and temporary storage of excavated materials; at various locations within construction works area boundaries..

**See Figure 1: Locational Context of UWF Related Works**

**See Figure 2 Layout of UWF Related Works.**

**4.2.2 UWF Related Works - Protection Measures for European Sites**

**4.2.2.1 Scheduling of Works to protect European Sites:**

To protect the special conservation interest (hen harrier) of the Slievefelim to Silvermines Mountain SPA, and qualifying interests of the Lower River Suir SAC and Lower River Shannon SAC, the following timing or scheduling of works will be implemented during the Construction Stage:

- No construction works for UWF Related Works will take place during the hen harrier breeding season (March to August).
- Additionally, during the hen harrier roosting season, (October to February), construction works will only be carried out during the period between one hour after sunrise and one hour before sunset in areas within 1000m of an active winter roost.
- To reduce the potential for localised in-combination effects on surface water quality from the main potential sediment sources during construction works (i.e. Watercourse Crossing Works, Earthworks, Tree Felling and Excavation Dewatering), a phased approach will be undertaken during the construction works for these activities, where works within 50m of a Class 1 or Class 2 watercourse are required. The phased approach will only permit one of main potential sediment producing activities to be carried out at any one time within the local catchment to a watercourse (refer to Chapter 11: Water).
- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses.
- If an active otter holt (holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken while cubs are present in the holt.
- All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter.

**4.2.2.2 Environmental Protection Project Design Measures**

The following protective measures (Project Design Measures) which have been devised to prevent environmental effects on key Biodiversity receptors, are herein presented for the first time within the context of the evaluation of likely significant effects on European Sites. Adherence to these measures will be a contractual obligation on appointed contractors. The implementation of all Biodiversity related measures will be monitored by the appointed Project Ecologist and Environmental Clerk of Works.

**Schedule of Project Design Environmental Protection Measures**

PD ID	Schedule of Project Design Environmental Protection Measure
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD05	Land reinstatement will not be carried out during very wet weather or when the soil is waterlogged.
PD06	If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted



PD ID	Schedule of Project Design Environmental Protection Measure
PD09	New permanent access roads (Realigned Windfarm Roads) will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
PD11	Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.
PD12	A phased approach will be undertaken in relation to watercourse crossing works, earthworks, forestry felling and excavation dewatering, where these works occur within 50m of a Class 1 or Class 2 watercourse. The phased approach will only permit one of main potential sediment producing activities, listed above, to be carried out within 50m of a Class 1 or Class 2 watercourse, at any one time.
PD13	All excavated material will be removed for temporary or permanent storage at a suitable location more than 50m away from all other Class 1 and Class 2 watercourses. Spoil excavations from public roads being transported to landfill will be covered during transport.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.
PD16	For works within 50m of a Class 1 or Class 2 watercourse, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD17	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound (Consented Upperchurch Windfarm Site Compound No.1). All fuel will be stored in banded, locked storage containers.
PD20	Overnight parking of plant and machinery will only be permitted at locations which are greater than 50m from watercourses and where there is an existing hard-core surface in place.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells
PD22	In-stream works at Class 1 and Class 2 watercourses will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD23	In-stream works will not be undertaken without isolation of flow within the watercourse, any fish within the isolated section will be removed using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping, flume (pipe) or channel diversion methods.
PD24	All new permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be a minimum of 900mm in diameter regardless of the anticipated flood flow.
PD25	All new permanent culverts on Class 1 and Class 2 type watercourses will be bottomless or clear spanning.

PD ID	Schedule of Project Design Environmental Protection Measure
PD26	<p>Confirmatory hen harrier breeding surveys will be completed, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter.</p> <p>No construction works for UWF Related Works will take place during the hen harrier breeding season (March to August).</p>
PD27	<p>During the hen harrier roosting season (October to February inclusive), construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset.</p>
PD28	<p>Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season <i>i.e.</i> not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming.</p>
PD29	<p>Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.</p>
PD30	<p>All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter.</p>
PD31	<p>If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken <i>while cubs are present in the holt</i> and NPWS will be notified immediately</p>
PD32	<p>No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license.</p>
PD33	<p>The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.</p>

**4.2.2.3 Best Practice Measures as part of the UWF Related Works design**

The following protective measures (Best Practice Measures) have been developed for UWF Related Works by the authors of this NIS along with the authors of the EIAR Water chapter (Hydro Environmental Services). These Best Practice Measures are included in full in the EIAR Biodiversity Chapter (A12) and in the UWF Related Works Environmental Management Plan (A10).

BPM ID	Best Practice Measure
RW-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used

BPM ID	Best Practice Measure
RW-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
RW-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
RW-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
RW-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
RW-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
RW-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
RW-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
RW-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
RW-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas
RW-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
RW-BPM-12	Monitoring of nesting and roosting Hen Harrier ( <i>Circus cyaneus</i> )
RW-BPM-16	Monitoring of non-native invasive plant species
RW-BPM-17	Best practice measures for the removal of vegetation during construction
RW-BPM-18	Best practice for the protection and preservation of tree roots during the construction phase
RW-BPM-21	Disturbance and/or physical injury to Other Mammals
RW-BPM-22	Management of general non-native invasive species
RW-BPM-23	Best practice methods to ensure the protection of common frog ( <i>Rana temporaria</i> ) and smooth newt ( <i>Triturus (Lissotriton) vulgaris</i> ).
RW-BPM-24	Best practice methods to ensure the protection of Viviparous lizard ( <i>Lacerta (Zootoca) vivipara</i> )
RW-BPM-28	Minimising Disturbance and Damage to Land
RW-BPM-29	Minimising Dust Emissions From Site Activities

#### 4.2.2.4 **Management Plans as part of the UWF Related Works design**

The implementation of the Project Design Measures and Best Practice Measures along with monitoring arrangements and emergency response procedures will be managed under a dedicated UWF Related Works Environmental Management Plan (copy included as Appendix A9). Management plans in respect of Surface Water Quality Management, Invasive Species Management and Waste Management, have also been developed and are provided in Tabs 4, 5 and 6 respectively of the appended UWF Related Works Environmental Management Plan (Appendix A9).

**4.2.2.5 Environmental Emergency Response Measures as part of the UWF Related Works design**

Emergency or contingency measures relating to fuel or oil spillage, or significant pollution occurrence in local surface waters are included in Section 6 of the UWF Related Works Environmental Management Plan (Appendix A9).

### 4.2.3 UWF Related Works - Construction Stage

The construction process for the UWF Related Works, is a relatively straightforward civil build. A number of separate dedicated 'crews' will work from the consented compound associated with the Upperchurch Windfarm (Site Compound No.1), each working on a different part of the UWF Related Works. The workers will arrive and depart daily to and from the relevant construction compounds, parking spaces will be provided at the site compound. The various crews will then be transported to the specific works location by means of 'crew-cab' 4x4 vehicles or similar. Bulk deliveries of materials will be delivered to the site compound and stored there until needed. Materials required at works locations will be transported by way rigid body vehicle or tractor and trailer. Aggregate and concrete will be delivered directly to works locations.

#### 4.2.3.1 Construction Timescale and Resource Requirements

**Duration & Timing of Construction:** The main construction period will take 6 to 8 months to complete. The projected start date is towards the end of 2019. The UWF Related Works will take place during the same period as the construction of the Upperchurch Windfarm and potentially during the same period as Upperchurch Windfarm Grid Connection. Pre-construction activities will be carried out immediately prior to the commencement of the main construction period; these activities will include detailed design, confirmatory surveys, felling, and hedgerow or tree removal or pruning. Normal construction hours of work will be 07.00 to 19.00hrs Monday to Friday and 08.00 – 16.30hrs on Saturdays.

**Construction Personnel:** The civil and electrical construction personnel involved in the construction of the Upperchurch Windfarm will also be involved in the construction of the Internal Windfarm Cabling, Realigned Windfarm Roads, Haul Route Works and the construction of the Telecom Relay Pole compound and the installation of underground communication and electricity cables between the existing Foilnaman Mast and the Relay Pole compound, no extra personnel will be required for these works and c.5 personnel from the Upperchurch Windfarm construction crew will be involved in the UWF Related Works. A specialist communication engineering crew, made up of c. 3 personnel, will be involved in the erection and set up of the Telecom Relay Pole.

**Construction Materials** include 23 loads of semi-dry lean mix concrete, 285 loads of crushed stone, 7 loads of hard core for temporary public road surfaces, 2 loads of public road surface dressing, geotextile, ducts and duct jointing collars, electrical cabling, cable protection strip and warning tapes, cable marker posts and plates, Telecom Relay Pole and telecommunication equipment, hedging, fencing materials including posts, rails and wire, precast concrete and HDPE culverts, geotextile/plastic/bog matting.

**Machinery** to be used includes 2 tracked excavators, 2 tracked dumpers, compaction plate, cable pulling machine, vibrating roller, pole planter and auger drill, and 2 4X4 crew vehicles.

**Equipment and tools** to be used include hand tools, cable-jointing tools, dewatering and water pumps and pipes, diesel generator, sand bags, silt traps, silt fences, oil absorbent booms, siltbuster units and skips, wooden stakes and wooden fencing lates, boundary taps and wire, battery powered electric fencers, geotextile/plastic matting.

#### 4.2.3.2 Construction Access

HGV loads of aggregate, concrete and public road dressing will be delivered directly to construction works areas. These HGVs will travel to the works areas using both the regional and local road networks, as specified on Figure RW 5.23 (included at end of Appendix A4).

Other materials, such as ducting, geotextile and other construction materials, will be sourced from various suppliers and will be transported to the Upperchurch Windfarm Site Compound No.1 via the national and regional road network, as identified on Figure RW 5.24 (included at end of Appendix A4).. This material will be stored at Upperchurch Windfarm Site Compound No.1 until required at works areas. Each day a smaller truck will be used to deliver the daily volume of ducting, matting, cable protection strip, warning tape, duct jointing collars etc. to each active works area.

#### **4.2.3.3 Construction Methodology for UWF Related Works**

Outline Construction Methodologies (OCMs), *based on the standard construction methods*, for all of the main works and activities of UWF Related Works, which are listed below, can be found at (included in Appendix A9 Environmental Management Plan for UWF Related Works. In the OCMs, a brief description of the work involved; the duration of this work; personnel, machinery, equipment and tools requirements; construction materials; details of the standard methodology for the construction activities and any variations to those methods are also outlined. These OCMs are specific to each distinct body of work or activity. The final Method Statements for the construction works will be developed by the appointed Contractor and will be based on these OCMs. Construction stage activities will involve the following works:

- Pre-Construction Activities
- Construction Works Area Preparation
- Temporary Site Entrances
- Realigned Windfarm Roads
- Temporary Access Roads
- Haul Route Works
- Telecom Relay Pole
- Internal Windfarm Cabling
- Instream Works Preparation and Reinstatement
- Instream Works
- Bailey Bridge
- Relocation of Overhead Lines
- Felling of Forestry
- Overburden Storage Berms
- Reinstatement of Land

#### 4.2.4 UWF Related Works: Operational Stage

Once constructed and commissioned, as required, the UWF Related Works will be operated and maintained as part of the Upperchurch Windfarm.

**Operational Personnel:** The personnel involved in the operation and maintenance of the Upperchurch Windfarm will also be involved in the operation and maintenance of the UWF Related Works. In addition, 2-3 No. specialised telecommunications personnel will be involved in an annual inspection and maintenance of the Telecom Relay Pole.

**Duration of the Operational stage:** The duration of the operational period for the UWF Related Works will correspond with the operational period of the Upperchurch Windfarm which is granted for 25 years from the date of commissioning of the wind turbines under Condition 4 of the grant of planning permission for Upperchurch Windfarm, unless a planning period for a further period is granted.

**Operational activities** will take between 2 days and 2 weeks per year, mainly consisting of visual inspections (2 to 3 days per year), though 2 to 7 days of Haul Route Works activities may be required during turbine component deliveries which may occur infrequently during the operational stage of the windfarm.

#### 4.2.5 UWF Related Works: Use of Natural Resources, Emissions & Waste

**Use of Natural Resources:** 20.9 hectares of land within the full UWF Related Works construction site which is reduced to just 25m<sup>2</sup> around the Telecom Relay Pole compound, during the operational phase; 4750m<sup>3</sup> of topsoil, 6670m<sup>3</sup> of subsoil and 360m<sup>3</sup> of rock will arise from excavation works; small amounts of potable and non-potable water will be imported onto the site as required; 170m of hedgerow and 4 No. trees will be removed and the equivalent amount replanted following construction.

**Emissions:** Insignificant dust, construction machinery exhaust, noise, vibration and light will be emitted during the Construction Stage. During the Operational Stage there will be negligible dust, vehicle exhaust, noise, vibration and light emitted. The operational electrical plant will be a source of electromagnetic fields but these emissions will be negligible - c. less than a tenth of the International Commission on Non-Ionising Radiation Protection exposure limit, at a point directly above the operating cable.

**Waste:** UWF Related Works personnel will use the welfare facilities and waste facilities provided at the Windfarm Site Compound No. 1 and No. 2. At these facilities, waste water will be contained in self-contained units and emptied by a licenced facility or, in the case of the Site Offices, will be treated in the existing septic tank. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at Site Compound No.1 and collected by an appropriately licenced waste contractor. There will be minimal general and chemical waste during the Operational Stage. This waste will be stored in a designated and secure area at the windfarm site offices and collected by an appropriately licenced operator. Welfare facilities for the O&M crew will be provided at the windfarm site offices. Any wastes which result from the construction, operation and decommissioning of UWF Related Works will be managed under the Waste Management Plan for the operating UWF.

#### 4.2.6 Identification of Other Projects considered for in-combination effects

It has already been determined at Screening Stage 1, that UWF Related Works has *potential* to cause effects to three European Sites: **Lower River Shannon SAC, Lower River Suir SAC, and Slievefelim to Silvermines Mountain SPA.**

##### 4.2.6.1 Other projects associated with the Whole Upperchurch Windfarm Project

The location of the proposed UWF Related Works is partly within the footprint of the consented Upperchurch Windfarm, and is part of a larger whole project which also includes UWF Replacement Forestry (approved), UWF Grid Connection (pre-planning) and UWF Other Activities.

All of these other projects Upperchurch Windfarm (consented), UWF Replacement Forestry (approved), UWF Grid Connection (pre-planning), and UWF Other Activities) are evaluated for in-combination impacts with UWF Related Works to each of the 3 no. European sites - Lower River Shannon SAC, Lower River Suir SAC, and Slievefelim to Silvermines Mountain SPA.

##### 4.2.6.2 Other Unrelated Projects and Activities

Other projects which are considered for in-combination effects for each Site include unrelated projects. Research of other projects with potential to cause in-combination effects with UWF Related Works to the 3 no. European Sites was carried out. It was evaluated by the authors, in conjunction with the authors (David Broderick and Michael Gill of Hydro-Environmental Services) of the EIA Report Water Chapter, that:

- projects located in the Mulkear River Regional catchment had potential to cause in-combination effects to the Lower River Shannon SAC,
- projects located in the Clodiagh River regional catchment had potential to cause in-combination effects to the Lower River Suir SAC, and that
- projects located in the SPA boundary, or within 2km of the SPA boundary had potential to cause in-combination effects to the Slieve Felim to Silvermines Mountain SPA.

A Scoping Exercise was carried out, to determine which projects also overlapped temporal boundaries for cumulative effects (i.e. which projects could cause effects during the same relevant time period as UWF Related Works), and then which of these projects had any potential to cause in-combination effects with UWF Related Works to the European Site.

The Scoping Exercise (contained in Appendix A14) resulted in the following unrelated projects being included for consideration of in-combination effects in the evaluations:

Lower River Shannon SAC: Bunkimalta Windfarm;

Lower River Suir SAC: no other unrelated projects are included;

Slieve Felim to Silvermines Mountain SPA: Milestone Windfarm (existing), Bunkimalta Windfarm and Castlewaller Windfarm (both consented), and Agricultural, forestry and turf-cutting activities.

The location of other projects in the context of the boundaries of the 3 no. European Sites and in the context of the location of UWF Related Works is provided on **Figures 4 and 5.**



### 4.3 Description of Other Projects Included for In-Combination effects

#### 4.3.1 Upperchurch Windfarm (consented)

Upperchurch Windfarm (UWF) will comprise 22 No. wind turbines, 2 No. meteorological masts, 22 No. turbine foundation and crane hardstanding areas, site roads and an electrical substation. Consented by Tipperary County Council Planning Ref. No. 13/51/0003 in January 2014, and by An Bord Pleanála Ref. PL22.243040 in August 2014. The purpose is to convert the energy in the wind blowing on site, into electricity for export to the National Grid.

The Upperchurch Windfarm site is located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. This is an area 2km west of Upperchurch village and 18km to the west of Thurles, County Tipperary. The windfarm and ancillary works will be constructed on a series of small hills ranging in elevation from 280m to 401m OD, set out generally over four areas. The electrical substation will be constructed in Knockcurraghbola Commons and the wind turbines will be connected by underground cables to this substation. There will be two meteorological masts erected, one in Grousehall and a second in Knocknamena townlands. Ancillary Works will include borrow pits in Shevry, Knocknamena, Knockmaroe and Grousehall; 1 No. site entrance from the R503 Regional Road at Graniera; and 10 No. site entrances from local public roads, through and around the site, which will provide access to the windfarm.

**Previous Appropriate Assessment of Upperchurch Windfarm:** It should be noted that the Upperchurch Windfarm has already been subject to Appropriate Assessment by An Bord Pleanála and therein considered, either individually or in combination with other plans and projects, to not result in adverse effects on the integrity of a European Site<sup>2</sup>.

**Passage of Time:** There have been no material changes to the receiving environment of the Upperchurch Windfarm since 2014.

The Conservation Objectives and Qualifying Interests/Special Conservation Interests applying to the relevant European Sites, as set out in Section 10 of the An Bord Pleanála Inspectors Report (June 2014), remain the same in January 2019.

In relation to aquatic species and aquatic habitat quality, a comparison of EPA monitoring data for 2012 and 2017 demonstrates that water quality in the catchment into which the windfarm site drains, has remained stable.

In relation to Otter species, there has been no change in the characteristics of watercourses on the Upperchurch Windfarm site since 2012/2013, and surveys for UWF Related Works confirmed a lack of otter in the Upperchurch Windfarm site.

In relation to Hen harrier species, the makeup of suitable habitat for hen harrier species on the Upperchurch Windfarm site has not materially changed since 2012/2013, and the frequency of use by hen harrier, recorded during the 2012/2013 surveys, is supported by the results of the Upperchurch and Milestone surveys described in respect of recent years. By reason of distance from likely centres of activity for Hen Harrier (nearest confirmed nests), usage of the Upperchurch Windfarm site has continued to remain low and does not demonstrate any dependency by birds breeding within the SPA upon lands where the consented Upperchurch Windfarm is to be located.

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<sup>2</sup> An Bord Pleanála PL22.243040.

**4.3.1.1 Environmental Protection Measures as part of the consented Upperchurch Windfarm**

The consented Upperchurch Windfarm includes planning permission conditions and a number of protective and management Environmental measures. These measures are included in the 2013 EIS, 2013 RFI and 2014 Grant of Permission, see A16. These measures are also included in the Compiled Description of consented Upperchurch Windfarm (A7). These measures will be implemented through two separate Environmental Management Plans for the UWF; one for the construction stage and one for the early operational stage. A copy of these Plans was submitted with the 2013 RFI documents. The relevant planning permission conditions, in respect of European Sites, are listed below.

Condition-1	The development shall be carried out and completed in accordance with the plans and particulars lodged with the application.
Condition-2	All environmental mitigation measures set out in the Environmental Impact Statement, Natura Impact Statement and associated documentation shall be implemented in full.
Condition-6	Prior to commencement of construction, details of the phasing of the construction works shall be agreed with the National Parks and Wildlife Service
Condition-10	The construction works shall be carried out in accordance with construction details submitted to the planning authority, including the Construction Management Plan.
Condition-15	The management of drainage and surface water during the construction stage shall be in accordance with the details submitted in the Construction Management Plan, the Ecological Management Plan and the Environmental Management Plan. Furthermore, revised drawings shall be submitted to the planning authority prior to commencement showing compliance with condition 15 regarding fuel storage, designated refuelling areas, wheel wash areas and concrete wash areas.
Condition-16	There shall be no new provision for discharge of foul effluent on site without a prior grant of planning permission.
Condition-17	Prior to construction between mid-March and mid-August, a survey for breeding hen harriers shall be carried out. Taking account of the results of this survey, no construction works shall be carried out within the above period within 500m of a pre nesting breeding site, except with the written approval of the National Parks and Wildlife Service.
Condition-18	The Ecological Management Plan submitted shall be implemented in full. A timescale of enhancement of foraging areas, rush management, hedgerows enclosures and trees and land management shall be agreed with the planning authority following consultation with the National Parks and Wildlife Service prior to commencement. A programme of ongoing surveys and monitoring in years 2 and 3 after commencement of the operation of the turbines shall be submitted and agreed in writing with the planning authority following consultation with the National Parks and Wildlife Service prior to commencement.
Condition-19	Details as outlined in the Ecological Management Plan shall be implemented. A timescale for implementation shall be submitted and agreed in writing with the planning authority following consultation with the National Parks and Wildlife Service prior to commencement
Condition-21	Mitigations measures submitted for the protection of water quality shall be implemented in full and according to best practice guidelines. The works shall be supervised as set out in the Construction Management Plan. In the event of a water pollution incident or damage the relevant authorities shall be immediately notified and works cease until authorized to continue. A programme of hydrographic monitoring shall be carried out over a period commencing pre-construction and concluding in year 3 of the operational phase of the development.

**4.3.1.2 Best Practice Measures as part of the Upperchurch Windfarm design**

The Management Plans and mitigation measures which were included in the 2013 EIS and 2013 RFI include best practice measures to protect the receiving environment.

In addition, Condition-21 includes: Mitigation measures submitted for the protection of water quality shall be implemented in full and according to best practice guidelines. The works shall be supervised as set out in the Construction Management Plan. In the event of a water pollution incident or damage the relevant authorities shall be immediately notified and works cease until authorized to continue. A programme of hydrographic monitoring shall be carried out over a period commencing pre-construction and concluding in year 3 of the operational phase of the development.

Treatment of waste arising during construction, operation and decommissioning, in line with Best Practice is described in Section A5.5-5.4.3 of Appendix A9 of this document.

**4.3.1.3 Management Plans as part of the Upperchurch Windfarm consented design**

Environmental protection measures will be implemented during the development of the Upperchurch Windfarm through the Construction Environmental Management Plan, the Early Operational Phase Environmental Management Plan and the Ecological Management Plan. The implementation of these plans is a condition of planning permission (Condition No. 15 of the 2014 Grant of Permission for Upperchurch Windfarm). We refer Section 5.3.1.4.

**4.3.1.4 Environmental Emergency Response Measures as part of the Upperchurch Windfarm design**

Environmental Accidents, Incidents and Corrective Actions Procedures are included in the Construction Environmental Management Plan for Upperchurch Windfarm (included in Appendix A11).

We refer Section 5.3.1.4.

#### 4.3.2 UWF Replacement Forestry (approved)

UWF Replacement Forestry relates to the planting with forestry, of 6ha of agricultural lands. An afforestation license for UWF Replacement Forestry was granted by the Minister for Agriculture, Food and the Marine on 07/11/2018. The application for the licence was accompanied by an Appropriate Assessment Report.

Located at Foilnaman townland, near Upperchurch, County Tipperary, 6 hectares (6ha) of agricultural grassland at will be planted with native woodland species, set in clusters of well-matched native species. There will be varied spacing created between the clusters according to Forest Service recommendations. A mixture of tall trees and understory shrubs will be planted, and the design includes wide ride-lines between deeper areas of core woodland. The ride-lines will create open spaces with tree-lined boundaries, which is much favoured by birds of prey during the day (e.g. hen harrier) and bats at night as hunting ground. A mixture of land cover – tall grasses, short grasses and scrub will be maintained under the planting and in the ride lines. Tree guards will be used to protect the saplings and young trees from rabbit damage. A livestock-proof fence will be erected around the perimeter of the planting. The lands to be afforested are currently in two agricultural landholdings. A small watercourse, with an existing culvert crossing, runs through the centre. The existing riparian habitat along this watercourse will be enhanced through planting with hazel, alder and willow species and the entire afforestation land will be protected from livestock by the perimeter fencing. The UWF Replacement Forestry will be designed and planted in accordance with the *Forest Service (2006) Information Note No. 5: Establishment, Design and Stocking Densities of New Native Woodland* and *Felling and Reforestation Policy published by the Forest Service (May 2017)*.

##### 4.3.2.1 Environmental Protection Measures as part of the UWF Replacement Forestry design

The following protective measures (Project Design Measures) for UWF Replacement Forestry have been developed by the authors of this NIS along with the authors of the EIAR Water chapter (Hydro Environmental Services). These Project Design Measures are listed below and are included in the Description of UWF Replacement Forestry (A6).

PD ID	Environmental Protection Measure for UWF Replacement Forestry
RF-PD 01	All planting and maintenance activities will be carried out during daylight hours
RF-PD 02	The lands will be planted by hand, using spades and hand tools.
RF-PD 03	No pesticide or fertilizer will be used at the UWF Replacement Forestry site.
RF-PD 04	There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the site.
RF-PD 05	A water setback from the watercourse which flows through the site will be established during planting works. The setback will be 10m from the edge of the watercourse. No planting or other works will be carried out in this 10m wide buffer area. Native woodland will be planted beyond this distance in accordance with Silvicultural Standards for Native Woodland Establishment GP9 & GP10 (Department of Agriculture, Food and the Marine, 2015).
RF-PD 06	No planting works will take place within 500m of an active hen harrier nest, or active nesting activity, during the months of March to August. Additionally, during the winter season, October to February, planting works will only be carried out during the period between one hour after sunrise and one hour before sunset in areas within 1000m of an active winter roost.
RF-PD 08	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.

RF-PD 09	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter.
RF-PD 10	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken <i>while cubs are present in the holt</i> and NPWS will be notified immediately.
RF-PD 11	No wheeled vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license.
RF-PD 12	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.

**4.3.2.2 Best Practice Measures as part of the UWF Replacement Forestry design**

The following protective measures (Best Practice Measures) have been developed for UWF Replacement Forestry by the authors of this NIS along with the authors of the EIAR Water chapter (Hydro Environmental Services). These Best Practice Measures are included in full in the EIAR Biodiveristy Chapter (A13).

RF-BPM-01	Monitoring of non-native invasive plant species
RF-BPM-02	Management of general non-native invasive species
RF-BPM-03	Best practice methods to ensure the protection of Viviparous lizard ( <i>Lacerta (Zootoca) vivipara</i> )

**4.3.2.3 Environmental Emergency Response Measures as part of the UWF Replacement Forestry design**

Due to the nature of the planting works and management activities associated with UWF Replacement Forestry, no emergency response measures are required.

### 4.3.3 UWF Grid Connection (Pre-planning)

An application for planning permission for a revised UWF Grid Connection will most likely be submitted directly to An Bord Pleanála under Section 182A (9) of the Planning and Development (Strategic Infrastructure) Act (2006). The application will be accompanied by an EIA Report and its own Appropriate Assessment. A pre-application request was made to An Bord Pleanála on 4th January, 2019. ABP Ref. No. 303385-19. The UWF Grid Connection will comprise of the following:

**Mountphilips Substation:** A new substation is proposed for a location adjacent to the existing Killonan - Nenagh 110kV overhead line in agricultural grassland in Mountphilips townland, 2km north of Newport, 4km south of Birdhill, 17km north east of Limerick City and 23km west of the Upperchurch Windfarm. The new 110kV electrical substation will comprise 2 No. End Masts located at the Killonan – Nenagh 110kV overhead line; a compound, 230 meters east of the overhead line, measuring 95 meters x 94 meters which will contain a control building; 110kV busbars; circuit breakers; line disconnects; current and voltage measuring equipment; cable chairs; surge arresters; lightning protection monopoles and other electrical apparatus. The 2 No. End Masts will be connected to the electrical equipment in the compound via underground cable.

**Mountphilips - Upperchurch 110kV UGC:** The 110kV UGC will connect Mountphilips Substation to Upperchurch Windfarm through the Consented UWF Substation, through the installation of underground cables along the public road. The preferred route of the 110kV UGC, which is 28.9km in length, will follow a generally west/east course along the Public Road - Thurles to Newport Regional Road R503. The 110kV UGC route starting at Mountphilips Substation will be under a grassland field for 0.52km; under Local Road L2166-0 for 2.26km, under the Regional Road R503 for 23.14km; under the L2264-50 for 1.93km; the L6188-0 for 0.33km and under a Private Farm Road for 0.72km as far as UWF Substation. The route is through the townlands of Mountphilips, Coole, Freagh, Foildarrig, Newport, Tullow, Cooldrisla, Derryleigh, Kilnacappagh, Scraggeen, Derrygareen, Inchadrinagh, Knockancullenagh, Fanit, Lackamore, Toorenbrien Upper, Toorenbrien Lower, Reardnogy Beg, Reardnogy More, Shanballyedmond, Baurnadomeeny, Coonmore, Foildarragh, Kilcommon, Loughbrack, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons. The 110kV UGC will be installed in trenches, which will be laid with ducts through which the electrical cables and communications cables will be pulled. The cable lengths will be pulled through and joined together at Joint Bay locations, in joint bay chambers. The ducts will be surrounded by concrete and the trench backfilled with aggregate and the road surface will be reinstated according to Local Authority specifications. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates.

**UWF Grid Connection Ancillary Works** will support the construction of UWF Grid Connection and will include the construction of a new Permanent Entrance at Coole townland (including the provision of sightlines) and Permanent Access Road from the new entrance to the proposed substation at Mountphilips townland; construction and use of a Temporary Compound at Mountphilips; replacement of watercourse crossing structures; installation of drainage systems at Mountphilips Substation, around the Temporary Compound and along the new Access Road; fencing; protection of existing underground services; provision of electricity supply to Mountphilips substation; excavation and reinstatement and disposal of spoil; hedgerow/tree removal at Mountphilips and hedgerow replanting and site reinstatement.

#### 4.3.3.1 Environmental Protection Measures as part of the UWF Grid Connection design

The following protective measures (Project Design Measures) have been developed for UWF Grid Connection by the authors of this NIS along with the authors of the EIAR Water chapter (Hydro Environmental Services). These Project Design Measures are listed below and are included in the Compiled Description of UWF Grid Connection (A4)

**Environmental Protection Measures as part of the UWF Grid Connection design**

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at 110kV UGC works locations on the public road networks. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner
PD03	Construction works in <u>Knocknabansha</u> , Knockmaroe <u>Knockcurraghbola Crownlands</u> , and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm.
PD04	Confirmatory consultations with Irish Water, Eir and ESB and confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a foreman will look out for underground pipes during excavations near services.
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
PD08	All initial groundworks will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works. Any works to culverts will be monitored by an aquatic archaeologist. Works to bridges will be monitored by a suitably qualified archaeologist.
PD09	The new permanent access road at Mountphilips Substation will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD10	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips and for any culvert replacements along the 110kV UGC. No batching of wet cement will take place on-site.
PD11	At Mountphilips Substation, instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.
PD12	A phased approach will be undertaken in relation to excavations, excavation dewatering and any culvert replacement works, where these works occur within 50m of a Class 1 or Class 2 watercourse. The phased approach will only permit one of main potential sediment producing activities, listed above, to be carried out within 50m of a Class 1 or Class 2 watercourse, at any one time.
PD13	At Mountphilips Substation location, all excavated material will be removed for temporary or permanent storage at a suitable location more than 50m away from all other Class 1 and Class 2 watercourses.
PD14	At Mountphilips Substation location, temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	At Mountphilips Substation location, permanent overburden storage berms will be graded and seeded immediately after emplacement.

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD16	For works within 50m of a Class 1 or Class 2 watercourse, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD17	At Mountphilips Substation location , where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse.
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound at Mountphilips Substation. All fuel will be stored in bunded, locked storage containers.
PD20	Overnight parking of plant and machinery will only be permitted at the temporary compound in Mountphilips and at a distance greater than 50m from watercourses.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells
PD22	In-stream works or culvert replacement works at Class 1 and Class 2 watercourses will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD23	In-stream works or culvert replacement works will not be undertaken without isolation of flow within the watercourse, any fish within the isolated section will be removed using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping, flume (pipe).
PD24	All new permanent watercourse culverts and any replacement culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be a minimum of 900mm in diameter regardless of the anticipated flood flow.
PD25	All new permanent culverts in Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
PD26	If works are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory hen harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter. No construction works will take place within 2km of an active hen harrier breeding attempt or active nesting activity, during the breeding season (March to August).
PD27	During the hen harrier roosting season (October to February inclusive), construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset.
PD28	Hedgerow removal and clearance of any other breeding bird vegetation at the Mountphilips Substation entrance will take place outside of the bird breeding season <i>i.e.</i> not during the period of March to August inclusive.
PD29	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.
PD30	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter.



PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD31	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken <i>while cubs are present in the holt</i> and NPWS will be notified immediately
PD32	No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand will not take place within 15m of such holts, except under license.
PD33	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD34	Confirmatory surveys will be carried out within 50 m of either side of the construction works area boundary of identified badger setts to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 12 months in advance of proposed construction activities, during the period November and April when vegetation cover is reduced. NWPS will be notified immediately if the sett previously identified is confirmed as active or if a further active sett is located within 50 meters of the footprint of the development. If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005).
PD35	No construction works will be carried within 50m of an active sett during the main breeding season (December 1 <sup>st</sup> to June 30 <sup>th</sup> ).
PD36	Construction activity in the environs of a known active badger sett outside of the breeding period will follow NRA (2005) guidelines, i.e. no heavy machinery will be used within 30m of badger setts (unless carried out under license); lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand will not take place within 10m of sett entrances.
PD37	All construction works will be carried out during daylight hours. Security lighting will be used at the temporary compound. <u>All lighting</u> will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
PD38	Confirmatory surveys will be carried out at all trees with bat suitability that will require felling or other major modifications (e.g. removal of rotten branches). These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works in order to confirm the findings of the 2016 / 2017 surveys. (Note: 17 trees with low suitability were identified within the UWF Grid Connection construction works area boundary during 2016/2017 surveys).
PD39	Where a tree with moderate or high bat suitability is to be felled, a presence/absence bat surveys will be carried out. (Note. It is not expected that any trees with moderate or high suitability will be felled).
PD40	Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal.

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD41	Where the felling of trees with bat suitability is carried out, robust, weather-proof bat-boxes, for example Schwegler type 1FF and 2F models, will be placed in each of the affected sections to compensate for the loss of potential tree roosts. The number of bat boxes will match the number of trees with bat suitability to be felled. Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months, and will typically be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.
PD44	Construction works will not be carried out within 150m of a school, during school hours.
PD45	At Mountphilips Substation, water for welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD46	Mountphilips Substation will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD47	All Joint Bays will be located at least 50m from a Class 1 or Class 2 watercourse.
PD48	Only precast concrete chambers will be used at joint bays locations. No batching of wet cement will take place on-site.
PD49	<u>Lower River Shannon SAC:</u> The route of the 110kV UGC is located along existing paved public roadways and over paved public bridges within the SAC boundary. Construction works will be confined to the public road pavement within the SAC boundary.
PD50	<u>Lower River Shannon SAC:</u> There will be no storage of overburden within the Lower River Shannon SAC.
PD51	<u>Lower River Shannon SAC:</u> All excavations from public road trenches will be removed to landfill. Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
PD52	<u>Lower River Shannon SAC:</u> No in-streams works are proposed at the Newport (Mulkear) River and Bilboa River crossings (which are located within the SAC) and therefore there will be no placement of cement within the river channels. The 110kV UGC will be installed in the public road over bridges at these two locations. No instream works or culvert replacement works are proposed at any location within the SAC boundary.
PD55	<u>Lower River Shannon SAC:</u> Where dewatering of trenches or excavations is required along the R503, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag along the roadside verge
PD57	<u>Lower River Shannon SAC:</u> There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within 100m of the boundary of the Lower River Shannon SAC.
PD58	<u>Lower River Shannon SAC:</u> Construction works along sensitive areas (as define in PD59 below) of the route on the R503 will cease during heavy or prolonged rainfall events, and any open trenches will be covered. Use of weathering forecasting will be undertaking in advance of works.
PD59	Lower River Shannon SAC: Along “sensitive areas” of the 110kv route on the R503, work will only be completed during the spring/summer months when ground conditions are typically dryer. This will reduce the requirement for any excavation dewatering as a result of waterlogged soils.

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
	Sensitive areas are sections of the route on the R503 that are immediately upstream of the SAC (i.e. sensitive areas are sections where the smaller watercourses being crossed drain directly into the Clare River (W8 – W31) and the Bilboa River (W41 – W48)).
PD60	Lower River Shannon SAC: All existing roadside drains/drainage pathways on the R503 adjacent to the trench works area will be temporarily blocked to capture any pumped water / surface water runoff and a row of silt fencing will be placed along the downslope verge of the road
PD61	Lower River Shannon SAC: A member of CIEEM and the Institute of Fisheries Management will be present for all concrete pours within the SAC overlapping sections to ensure Best Practice is followed and that concrete washouts take place into designated bins for offsite removal
PD62	Lower River Shannon SAC: Prior to cement works (i.e. backfilling trench and bridge parapet works), all existing roadside drains and other drainage pathways at sensitive areas along the R503 will be temporarily blocked
PD63	Lower River Shannon SAC: The sections of trenches that overlap the SAC along the R503 will be lined with an impermeable geotextile to prevent potential migration of cement from the trench base/sides

**4.3.3.2 Best Practice Measures as part of the UWF Grid Connection design**

The following protective measures (Best Practice Measures) have been developed for UWF Grid Connection by the authors of this NIS along with the authors of the EIAR Water chapter (Hydro Environmental Services. These Best Practice Measures are included in full in the the Compiled Description of UWF Grid Connection (A4).

BPM No.	BPM Title
GC-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
GC-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
GC-BPM-04	Measures for Protection of Surface Water Quality during Replacing an Existing Culvert
GC-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
GC-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
GC-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden at Mountphilips Substation
GC-BPM-12	Monitoring of nesting and roosting Hen Harrier ( <i>Circus cyaneus</i> )
GC-BPM-13	Minimising the effects of lighting on bats

BPM No.	BPM Title
GC-BPM-14	Protection of potential tree and bridge bat roosts
GC-BPM-15	Bats – Post Construction Monitoring
GC-BPM-16	Monitoring of non-native invasive plant species
GC-BPM-17	Best practice measures for the removal of vegetation during construction
GC-BPM-18	Best practice for the protection and preservation of tree roots during the construction phase
GC-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher ( <i>Alcedo atthis</i> ).
GC-BPM-20	Monitoring of Identified Badger Setts
GC-BPM-21	Disturbance and/or physical injury to Other Mammals
GC-BPM-22	Management of general non-native invasive species
GC-BPM-23	Best practice methods to ensure the protection of common frog ( <i>Rana temporaria</i> ) and smooth newt ( <i>Triturus (Lissotriton) vulgaris</i> ).
GC-BPM-24	Best practice methods to ensure the protection of Viviparous lizard ( <i>Lacerta (Zootoca) vivipara</i> )
GC-BPM-26	Local Employment and Local Sourcing
GC-BPM-27	Landowner and Land-user Liaison
GC-BPM-28	Minimising Disturbance and Damage to Land
GC-BPM-29	Minimising Dust Emissions From Site Activities
GC-BPM-30	Traffic Management Measures
GC-BPM-31	Measuring Operational EMF Emissions
GC-BPM-32	Measuring Operational Electricity Production
GC-BPM-33	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works

#### 4.3.3.3 Management Plans as part of the UWF Grid Connection design

The implementation of the Project Design Measures and Best Practice Measures along with monitoring arrangements and emergency response procedures will be managed under a dedicated UWF Grid Connection Environmental Management Plan. Management plans in respect of Surface Water Quality Management,

Invasive Species Management and Waste Management will also form part of the Environmental Management Plan for UWF Grid Connection.

**4.3.3.4 Environmental Emergency Response Measures as part of the UWF Grid Connection design**

Environmental Emergency Response Measures will be included in the Environmental Management Plan.

#### 4.3.4 UWF Other Activities

Although UWF Other Activities do not require planning permission, they do form part of the whole UWF project and therefore are included in the cumulative evaluation.

The **Haul Route Activities** will facilitate the transportation of turbine components to the Upperchurch Windfarm site and are located at various points on the national and regional road network along the UWF turbine component haul route between Foynes Port in County Limerick and junction of the R503 and R497 Regional Roads in Knockmaroe townland, County Limerick. Activities comprise the laying of matting over verges at up to 5 No. locations, removal and replacement of street furniture (mainly signposts) at 13 No. locations and the trimming of up to 960m of hedgerow/trees at up to 15 No. locations.

The **Upperchurch Hen Harrier Scheme** will enhance and protect habitat for hen harrier in the vicinity of Upperchurch Windfarm, in order to fulfil planning condition No.18, attaching to the windfarm. The Upperchurch Hen Harrier Scheme is located in Knockcurraghbola Commons, Coumnageeha, Foilnaman, Knockmaroe and Grousehall townlands on 128ha of agricultural lands between the Slievefelim to Silvermines SPA and the Upperchurch Windfarm. Activities associated with the Scheme includes once off activities such as planting of hedgerows and trees; enhancement of riparian corridors and scrub/wood areas; and the fencing off of watercourses and newly planted trees and shrubs. The Scheme also includes long-term farm management practices such as management of rush coverage, livestock grazing and the control of the use of lime, fertilizers and burning of gorse, amongst others. Nine local landowners are signed-up to the Scheme. Implementation involves a mix of initial once-off activities which will both create new habitat and protect and enhance existing habitat; and on-going farming practices which will result in the long term maintenance of hen harrier habitat.

**Monitoring Activities** will monitor the Whole UWF Project for compliance with the environmental protection measures and mitigation measures detailed in the UWF 2013 EIS and 2013 RFI (including the Construction Environmental Management Plan for Upperchurch Windfarm and the Ecological Management Plan for Upperchurch Windfarm); Planning Conditions attaching to the already consented UWF; and measures in the 2018 UWF Grid Connection EIA Report, the 2018 UWF Related Works EIA Report and the 2018 UWF Replacement Forestry EIA Report and associated UWF Grid Connection Environmental Management Plan and UWF Related Works Environmental Management Plans. Monitoring will also involve the supervision and recording of key construction activities, and monitoring of progress of land reinstatement.

**Overhead Line Activities** include re-sagging activities and fibre wrapping activities. The purpose of the re-sagging activities is to correct the tension of the existing overhead line, following the installation of the UWF Grid Connection End Masts, so that the lines are held within predefined tension parameters. The purpose of fibre wrapping is to provide a communication link to the newly installed Mountphilips Substation. The tension will be corrected on 2 no. Sections - i) between ESNB Angle Mast Structure No. 79 (c.200m south of Mountphilips substation) to New Mountphilips End Mast No. 1 and ii) between New Mountphilips End Mast No. 2 and ESNB Angle Mast Structure No. 90 (2.3 km north of Mountphilips substation). Wrapping the overhead line with fibre optic cable from Killonan ESNB substation (just east of Limerick City) to Mountphilips substation. The Overhead Line Activities will be carried out according to industry standard method statements, including standard health & safety and environmental management systems.

**4.3.4.1 Environmental Protection Measures as part of the UWF Other Activities**

In relation to the UWF Other Activities (Element 5), the developer commits to the implementation of the following environmental protection measures, which are also included in the Description of UWF Other Activities (A8).

Except with the approval of the National Parks and Wildlife Service: no activities will be carried out within 500 metres of an active hen harrier nest or nesting attempt; no activities will be carried out within 30m of an active main badger set or within 150m of an active otter holt.
In order to prevent disturbance to breeding birds, tree trimming for Haul Route Activities will be conducted outside of the bird breeding season

**4.3.4.2 Best Practice Measures as part of the UWF Other Activities design**

In relation to the UWF Other Activities (Element 5), the developer commits to the implementation of the following Best Practice Measures. The following Best practice Measures in respect of Invasive Alien Species will be implemented, in addition to Best Practice measures and in respect of activities which may involve disturbance to lands or activities near watercourses (as part of the Upperchurch Hen Harrier Scheme for example, or in relation to required monitoring). These Best Practice Measures are included in full in the Description of UWF Other Activities (A8).

OA-BPM-01	Management of general non-native invasive species
OA-BPM-02	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
OA-BPM-03	Minimising Disturbance and Damage to Land

**4.3.4.3 Environmental Emergency Response Measures as part of the UWF Other Activities design**

Due to the nature of activities, no emergency response measures are required.

#### 4.3.5 Other Projects or Activities

##### 4.3.5.1 Existing Milestone Windfarm

Milestone Windfarm is an operational (since 2018) 6-turbine windfarm located adjacent to the southwest of the consented Upperchurch Windfarm with 5 No. turbines consented under planning ref: 12510385 at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera, Shevry and 1 No. turbine consented under planning ref: 1410 at Inchivara and Knockduff. An Environmental Impact Statement accompanied both planning applications for Milestone Windfarm – Ref: 12510385 & 1410.

Milestone Windfarm comprises wind turbines each with a maximum tip height of 126m, along with new access tracks, and electrical substation, a borrow pit and associated works. The grid connection associated with the Milestone Windfarm is towards the south at ESNB Cauteen Station, cabled along the public road network. Part of the landholding associated with the Milestone Windfarm occurs within one of the landholdings associated with the 110kV UGC element of the UWF Grid Connection, in Knockcurraghbola Commons.

Milestone Windfarm is located in the catchment of the Lower River Suir SAC, however has not been scoped in due to the absence of impact pathways because the windfarm is already built and ground works during operation would be negligible.

In relation to the Slieve Felim to Silvermines Mountain SPA, this windfarm is located outside the SPA, and lands at the windfarm are generally sub-optimal for Hen harrier, notwithstanding, Milestone Windfarm includes a Hen Harrier Management Plan.

##### 4.3.5.2 Consented Bunkimalta Windfarm

The Bunkimalta Windfarm is a consented 16-turbine windfarm, located on Coillte lands, c.2.5km to the north of the UWF Grid Connection at Bunkimalta, Bauraglanna, Lackabrack, Knockfune and Foilduff at, Keeper Hill, Co. Tipperary. An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 13510035.

Bunkimalta Windfarm will comprise 16 wind turbines, each having a rated electrical output of approximately 2,500 - 3,000 kilowatts, access tracks, a fenced Electrical Transformer Station comprising a single-storey Control Building and Substation, an effluent treatment system, three anemometer masts, repository areas, borrow pits and all associated site works, above and below ground. Each wind turbine will comprise a tower up to a maximum of 100 metres high, with a diameter of about 4 metres at the base. Three blades, up to a maximum of 50 metres in length, will be attached.

The Bunkimalta Windfarm will connect to the National Grid via an already consented underground grid connection to the existing Nenagh Substation, on the outskirts of Nenagh town. The Bunkimalta Windfarm could be constructed during the same period as the UWF Related Works and when built, will be operational during the operational stage of the UWF Related Works.

Bunkimalta Windfarm is located in the catchment of the Lower River Shannon SAC, (in the Newport River and Clare River sub-catchments) and inside the boundary of the Slieve Felim to Silvermines Mountain SPA, This windfarm is located in areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts, and will be subject to substantial management plans in respect of Hen Harrier.



#### **4.3.5.3 Consented Castlewaller Windfarm**

The Castlewaller Windfarm is a 16-turbine windfarm, comprising 16 wind turbine generators (each with a maximum hub height of 100m, maximum rotor diameter of 90m, and with a total tip height of 145m), one permanent meteorological mast, 2 borrow pits, a sub-station including a control building, new internal access roads, upgrading of existing internal access roads, expansion of drainage system, turbine hardstands, wastewater holding tank, underground cables and ancillary works which is located along part of the 110kV UGC route in Castlewaller townland. An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 11/51/0251 for Castlewaller Windfarm.

Castlewaller Windfarm has not as yet secured a grid connection offer to connect to the National Grid from either Eirgrid or E.S.B Networks and therefore is not likely to be in construction at the same time as the construction of UWF Related Works.

Castlewaller Windfarm is located in the catchment of the Lower River Shannon SAC, however has not been scoped in due to the absence of impact pathways because the Castlewaller Windfarm will not be constructed during same period as UWF Related and is therefore outside of the temporal study area boundary.

Castlewaller Windfarm is located inside the boundary of the Slieve Felim to Silvermines Mountain SPA, in areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts, and will be subject to significant management plans in respect of Hen Harrier.

#### **4.3.5.4 Activities – Forestry, Agriculture, Turf-Cutting**

Agriculture and forestry are the predominant land uses in the area of the Whole UWF Project.

Forestry is widespread within the Slieve Felim to Silvermines Mountain SPA (approximately half of the site is afforested, including both first and second rotation plantations and clear fell areas) and is consequently listed as one of the most important activities with high effect on the SPA (High negative rank).

Agriculture (hill farming) constitutes roughly one half of the land use within the SPA, and is mainly based on the usage of rough grassland. Grazing is a medium ranked activity both in terms of negative and positive impacts on the SPA. Within the SPA where it overlaps the CE Study area, certain land use activities are notifiable actions. In addition, a European Innovation Partnership (EIP) AGRI scheme supporting the maintenance of habitats for Hen Harrier with subsidies is in place. The SPA level goal for the SPA in 2018 was set at 4 confirmed nesting pairs of Hen Harrier.

Turf-Cutting or Peat Extraction, both mechanically and by hand is also a medium ranked negative pressure on the SPA. Cutover bog does exist within the SPA, but this may not be actively cut at the moment. Turf-cutting (rights to cut turf) exists at Bleanbeg Bog to the north of the Castlewaller area of the SPA.

**4.4 The Conservation Objectives of the 3 European Sites (2 SACs, 1 SPA)**

The conservation objectives of the European Sites concerned are to maintain the favourable conservation status of the key species and habitats for which the sites have been designated. These are summarised in respect of the European Sites (and Qualifying Interests/Special Conservation Interests going forward for further evaluation) in Table 5.2, Table 5.3 and Table 5.4, below and provided in their entirety in respect of each European Site within Appendix A2 of this document.

**4.4.1 Conservation Objectives of the Lower River Shannon SAC (002165)**

**Table 12: Conservation Objectives of the Lower River Shannon SAC (002165)**

Lower River Shannon SAC (002165)			
Atlantic Salmon ( <i>Salmo salar</i> ) (only in freshwater)			
To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:			
Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. The large hydro-electric station at Ardnacrusha and the Parteen regulating weir present considerable obstructions to upstream passage of salmon on the Shannon main channel. While both have fish passes installed, upstream migration of salmon is still problematical. Further weirs upstream on the Shannon also restrict access to spawning habitat. No such obstacles, causing significant fish passage issues for salmon are present on the Feale and Mulkear rivers
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2010). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The salmon stocks in the Shannon above the impoundments are significantly below their Conservation Limits. Salmon stocks in the Feale and Mulkear rivers are above CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL). The abundance of salmon fry at monitored sites on the Shannon main channel, above the hydro-electric station, is significantly below this target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice ( <i>Lepeophtheirus salmonis</i> ). On the Shannon main channel, salmon smolt abundance may be significantly affected by mortality passing through hydro- electric turbines
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat on the Shannon main channel

Lower River Shannon SAC (002165)			
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
<b>Floating river vegetation (3260)</b>	<b>To maintain the favourable conservation condition of Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	Three sub-types of high conservation value are known to occur in the site. See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details. Note: rooted macrophytes should be absent or trace (< 5% cover) in freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Cloon River within this SAC, because the mussel requires environmental conditions closer to natural background levels
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 13	See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Hydrological regime: freshwater seepages	Metres per second	Maintain appropriate freshwater seepage regimes	See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Substratum composition: particle size range	Millimetres	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (frequently sands, gravels and cobbles)	Although many of the high-conservation-value sub-types are dominated by coarse substrata, for certain sub-types, notably triangular club-rush ( <i>Schoenoplectus triquetus</i> ) and opposite-leaved pondweed ( <i>Groenlandia densa</i> ), fine substrata are required. See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Water quality: nutrients	Milligrams per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	The specific targets may vary among sub-types. See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details
Riparian habitat	Area	The area of riparian woodland at and upstream	See Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation supporting document for further details. See also the

Lower River Shannon SAC (002165)			
		of the bryophyte-rich sub-type should be maintained	conservation objective for Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> ) (91E0)
<b>Otter (<i>Lutra lutra</i>)</b>	<b>To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in Shannon catchment estimated at 70.5% (Bailey and Rochford 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds	No field surveys. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 4,461.6ha	No field surveys. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 500.1km	No field surveys. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 125.6ha	No field surveys. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston <i>et al.</i> , 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 17	Otters will regularly commute across stretches of open water up to 500m. e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed
<b>Sea Lamprey (<i>Petromyzon marinus</i>)</b>	<b>To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. See Gargan <i>et al.</i> (2011). Specific barriers serve to constrain the up- river migration of sea lamprey. The upper extent of the SAC in the R. Fergus is delineated by a barrier to migration. Barriers are also present in the Mulkear and Feale
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007)

<b>Lower River Shannon SAC (002165)</b>			
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Lampreys spawn in clean gravels. Surveys by Inland Fisheries Ireland (IFI) commonly indicated accumulations of redds downstream of major weirs. (See also Gargan <i>et al.</i> , 2011)
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Despite observed spawning activity, sampling for ammocoetes consistently fails to find these in many sampling stations and never in any great numbers
<b>Brook Lamprey (<i>Lampetra planeri</i>)</b>	<b>To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:</b>		
<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to brook lampreys' migration, both up- and downstream, thereby possibly limiting the species to specific stretches and creating genetically isolated populations (Espanhol <i>et al.</i> , 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Spawning site and redd attributes established by IFI (Rooney <i>et al.</i> , in press)
Availability of juvenile habitat	Number of positive sites in 2 <sup>nd</sup> order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King <i>et al.</i> , unpublished data)
<b>River Lamprey (<i>Lampetra fluviatilis</i>)</b>	<b>To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:</b>		
<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to river lampreys' migration, both up- and downstream, thereby possibly limiting species to specific stretches and creating genetically isolated populations (Espanhol <i>et al.</i> , 2007)

<b>Lower River Shannon SAC (002165)</b>			
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of river/brook lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King <i>et al.</i> , unpublished data)

Sourced from NPWS (2012) *Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. [Publication dated 07/08/2012; Accessed online on 07/11/2017]

**4.4.2 Conservation Objectives of the Lower River Suir SAC (002137)**

**Table 13: Conservation Objectives of the Lower River Suir SAC (002137)**

Lower River Suir SAC (002137)			
Floating River Vegetation (3260) To maintain the favourable conservation condition of Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation in Lower River Suir SAC, which is defined by the following list of attributes and targets:			
Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The description of habitat 3260 covers upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. The selection of Lower River Suir SAC used this broad interpretation. Conservation objectives for habitat 3260 concentrates on the high conservation value sub-types, however, little is known of the habitat's distribution or its sub-types in Lower River Suir SAC. There is a large number of lowland and tidal rivers in the SAC, as well as faster-flowing tributaries. Note: rooted macrophytes should be absent or trace (<5% cover) in freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Clodiagh River (Portlaw) within this SAC, because the mussel requires environmental conditions close to natural background levels
Habitat distribution	Occurrence	No decline, subject to natural processes	Further study is needed of Irish sub-types and their conservation value to interpret the broad description of habitat 3260 (European Commission, 2013). As noted above, little is known about the distribution of the habitat and its sub-types in Lower River Suir SAC. The uncommon, protected opposite-leaved pondweed ( <i>Groenlandia densa</i> ) was recorded in the SAC from floodplain ditches of the Suir near Carrickon-Suir and Clonmel, as well as the Clodiagh near Portlaw (Colgan and Scully, 1898; NPWS internal files). See NPWS (2012) for information on the requirements of opposite-leaved pondweed. There are no known records for rare or threatened bryophytes from the rivers in the SAC (Lockhart <i>et al.</i> , 2012). The rivers in the SAC are mainly lowland, depositing and tidal, and are likely dominated by marginal and submerged higher plants. Some fast-flowing rivers also occur that should, naturally, be dominated by macroalgae and bryophytes, with limited submerged or emergent higher plants
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	High conservation value sub-types are associated with natural hydrology. A natural flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For many sub-types, high flows are required to maintain the substratum necessary for the characteristic species. Flow variation can be particularly important, with high and flood flows being critical to the hydromorphology. Other aspects of hydrology, such as tidal regime, are important for certain sub-types of the habitat. The rivers in the SAC vary from naturally flashy, through depositing to tidal reaches
Hydrological regime: groundwater discharge	Metres per second	Maintain appropriate hydrological regime	Even small groundwater contributions can significantly alter hydrochemistry, particularly where there is basic bedrock and/or subsoils. Freshwater seepages can be very important in tidal reaches

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Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	Opposite-leaved pondweed ( <i>Groenlandia densa</i> ) is typical of the tidal reaches of large Irish rivers, e.g. Suir, Slaney, Shannon and Blackwater (see Preston and Croft, 2001; Preston, 2003). This species is listed as Near Threatened (Wyse Jackson <i>et al.</i> , 2016) and is protected on the Flora (Protection) Order, 2015 (Statutory Instrument No. 356 of 2015). Both the disturbance and substratum associated with the tidal regime may be important drivers
Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	Many of the high conservation value sub-types are dominated by coarse substrata, and it is likely that bedrock, boulders, cobbles and coarse gravels were naturally abundant in many tributaries in this SAC, particularly where the freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) occurred. Fine substrata are naturally abundant in depositing and tidal reaches. The size and distribution of particles are largely determined by the river flow. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver of rooted plant communities. Note: increased fine sediment is contributing to the unfavourable status of the freshwater pearl mussel in the Clodiagh. See the freshwater pearl mussel (1029) conservation objective
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The specific targets may vary among sub-types. Depositing and tidal stretches of rivers may, naturally, be more nutrient-rich and, therefore Water Framework Directive (WFD) good status may suffice in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos. Faster flowing tributaries that are naturally dominated by bryophytes and macroalgae typically require WFD high status. High status targets apply to freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) habitat in the Clodiagh (see The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 - S.I. No. 296 of 2009). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), Environmental Protection Agency (EPA) river water quality reports (e.g. Bradley <i>et al.</i> , 2015) and Ní Chatháin <i>et al.</i> (2013)
Typical species	Occurrence	Maintain typical species in good condition, including appropriate distribution and abundance	The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined. The typical species may include higher plants, bryophytes, macroalgae and microalgae, and invertebrates. As noted above, the protected vascular plant species opposite-leaved pondweed ( <i>Groenlandia densa</i> ) is associated with rivers and floodplains in the SAC. The banks of the Suir, particularly its tidal stretches, support a notable population of the rare <i>Rumex crispus subsp. uliginosus</i> (Green, 2008)
Floodplain connectivity	Hectares	Maintain floodplain connectivity necessary to support the typical species and vegetation composition of the habitat	River connectivity with the floodplain is important for the functioning of this habitat. Channels with a naturally functioning floodplain are better able to maintain habitat and water quality (Hatton-Ellis and Grieve, 2003). Floodplain connectivity is particularly important in terms of sediment sorting and nutrient deposition. High conservation value rivers are intimately connected to floodplain habitats and function as important wildlife corridors, connecting otherwise isolated or fragmented habitats in the wider countryside (Hatton-Ellis and Grieve, 2003; Mainstone <i>et al.</i> , 2016). Alluvial woodland (91E0) is an important feature of rivers in Lower River Suir SAC (see the conservation objective for 91E0)



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Fringing habitats Hectares	Hectares	Maintain marginal fringing habitats that support the typical species and vegetation composition of the habitat	Riparian habitats (including those along lake shores), particularly natural/semi-natural woodlands and wetlands, are an integral part of the structure and functioning of river systems, even where they do not form part of a natural floodplain. Fringing habitats can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates, assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling. Shade may also be important in suppressing algal growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. See Mainstone <i>et al.</i> (2016). Alluvial and riparian woodland is important for the rivers in Lower River Suir SAC
<b>Alluvial Forests* (91E0)</b>	<b>To restore the favourable conservation condition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) in the Lower River Suir SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least c.32.9ha for sites surveyed. See map 5	Alluvial forest was surveyed in Lower River Suir SAC by Perrin <i>et al.</i> (2008) as part of the National Survey of Native Woodlands (NSNW) at Fiddown (NSNW site code: 0022), Mountbolton (NSNW site code: 1823) and Ballycanvan Big (NSNW site code: 1839). Fiddown (0022) was also included in a national monitoring survey (O'Neill and Barron, 2013). The area of alluvial woodlands in the surveyed sites within the SAC is estimated to be 32.9ha. It is important to note that further unsurveyed areas of alluvial forest are present within the SAC, for example at islands below Carrick-on-Suir, at Shanbally (Coillte LIFE project site), Tibberaghny Marshes, along the lower stretches of the more westerly of the Suir tributaries and along both banks of the Suir as far east as the Dawn River (NPWS internal files). Map 5 shows the alluvial woodlands surveyed by Perrin <i>et al.</i> (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 5	Distribution based on Perrin <i>et al.</i> (2008). NB further areas are likely to be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; sub canopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin <i>et al.</i> (2008) and NPWS internal files
Woodland structure: community	Hectares	Maintain diversity and extent of community types	Described in Perrin <i>et al.</i> (2008) and NPWS internal files

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diversity and extent			
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder ( <i>Alnus glutinosa</i> ) and oak ( <i>Quercus</i> spp.) tend to regenerate poorly. Ash ( <i>Fraxinus excelsior</i> ) often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains, but not for woodland around springs/seepage areas
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) identify the site Ballycanvan Big (NSNW site code: 1839) as being "possible ancient woodland"
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin <i>et al.</i> (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder ( <i>Alnus glutinosa</i> ), willows ( <i>Salix</i> spp), oak ( <i>Quercus robur</i> ), ash ( <i>Fraxinus excelsior</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin <i>et al.</i> (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Norway spruce ( <i>Picea abies</i> ) and sycamore ( <i>Acer pseudoplatanus</i> ) occur at Shanbally (NPWS internal files). Spread of Japanese knotweed ( <i>Fallopia japonica</i> ) is a problem at Tibberaghny (NPWS internal files). Cherry laurel ( <i>Prunus laurocerasus</i> ) and rhododendron ( <i>Rhododendron ponticum</i> ) have been reported as occurring in part of Ballycanvan Big (NSNW site code: 1839) by Perrin <i>et al.</i> (2008), but not within the alluvial woodland.

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Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> )		To restore the favourable conservation condition of Freshwater Pearl Mussel in Lower River Suir SAC, which is defined by the following list of attributes and targets:	
Attribute	Measure	Target	Notes
Distribution	Kilometres	Restore distribution to 10.4km. See map 6	The conservation objective applies to the Clodiagh freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) population, which is listed on The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. (S.I. 296 of 2009). Full baseline distribution and abundance mapping was conducted in 2006 (Ross, 2006). Mussel habitat is widespread in the Clodiagh, with mussels almost continually present in low numbers from downstream of Clonea to above Portlaw (Ross, 2006). Mussels were nowhere abundant; maximum density was 3 per square metre (Ross, 2006). The habitat is significantly below carrying-capacity. The distribution in the Clodiagh has contracted since the 1990s (Ross, 2006). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Clodiagh system. See NPWS (2010) for further information
Population size	Number of adult mussels	Restore population to at least 10,000 adult mussels	Ross (2006) counted 1,206 mussels and estimated a total population of 2,412, concluding that, given the large areas of physically suitable habitat, a much larger population was previously present and a major population decline had occurred. Ross (2009) measured an 18.5% decline in mussel numbers between 2006 and 2009 at transect 1, indicating continued losses. Ross <i>et al.</i> (2017) recorded ‘rapid and alarming’ declines of 56-94% between 2006 and 2016 at five monitoring locations (67% decline overall). Moorkens (2010) estimated the population to be less than 10,000. The target of 10,000 is considered appropriate for a functional, self-sustaining population. NPWS (2013), in producing a national population estimate, assumed the Clodiagh population had declined at a rate of 3% per year. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Clodiagh system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of each population no more than 65mm in length; and at least 5% of each population no more than 30mm in length	Mussels ≤65mm are ‘young mussels’ and found buried in the substratum or beneath adult mussels. Mussels ≤30mm are ‘juvenile mussels’ and always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The Clodiagh failed both targets in 2006, 2009 and 2016 (Ross, 2006, 2009; NPWS, 2010; Ross <i>et al.</i> , 2017). Ross (2006) found no juveniles, ≤65mm extremely uncommon, smallest individual was 45.4mm and 97% was >80mm. In 2009, the smallest mussel was 78mm and (based on Ross, 1988) 15-20 years old (Ross, 2009). The smallest of 21 mussels measured in 1986 was 48.6mm (Ross, 1988). NPWS (2010) concluded there had been no successful recruitment from 1986 to 2009. The Clodiagh population is considered to be unsustainable owing to lack of survival of juvenile and adult mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. The Clodiagh failed both targets in 2009 (Ross, 2009; NPWS, 2010) and, as noted above, a major population decline has occurred (Ross, 2006; Ross <i>et al.</i> , 2017), and is presumed to be on-

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		scattered in distribution	going. In 2009, 1 transect and 1 delimited count were counted: T1 numbers had fallen from 27 in 2006 to 22, representing a 18.5% decline, while numbers were the same in C2. Seven dead shells were found among 23 live mussels at one location, indicating high mortality in parts of the Clodiagh. In 2016, 67 mussels were counted at five monitoring sites that had 205 mussels in 2006 (Ross <i>et al.</i> , 2017). The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system.
Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 8.8km in the Clodiagh system and any additional stretches necessary for salmonid spawning	Mussel habitat in the Clodiagh is known to occur from Clonea to Portlaw, and is sparsely occupied from c.630m downstream of Clonea to c.1.8km above Portlaw (Ross, 2006). Mussels were recorded at Portlaw as recently as the 1990s and downstream of Portlaw in the early 20th century. It is possible that some mussel habitat occurs upstream or downstream of the mapped stretches, but few mussels are likely to be found (Ross, 2006). The mussel habitat has been severely impacted for a significant period by sedimentation, other hydromorphological changes, organic pollution and eutrophication (NPWS, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The species' habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat but may lie upstream of the generalised mussel distribution. Only spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Availability of mussel and fish habitat is determined by flow and substratum conditions. It is highly sensitive to hydromorphological changes, sedimentation and enrichment. Pressures throughout the catchment contribute to such impacts. Mussel habitat is widespread in the Clodiagh but in unfavourable condition owing to sedimentation, other hydromorphological changes and nutrient enrichment. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system.
Water quality: Macroinvertebrate rate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality - macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	The EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). In 2009, the habitat in the Clodiagh system failed the macroinvertebrate target, but passed the phytobenthos target (Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). Q values in the mussel habitat were Q3-Q4 (Morgan, 2009). There has been a gradual decline in quality at several main-channel sites since the late 1970s (Morgan, 2009). Sewage discharge at Clonea is impacting water quality downstream of Clonea Bridge (Ross, 2006; Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: filamentous algae	Percentage	Restore substratum quality - filamentous algae: absent or trace (less than 5%);	The Clodiagh failed the macrophyte target, but marginally passed the macroalgal target in 2009 (NPWS, 2010). Patches of abundant <i>Ranunculus</i> were recorded by all surveyors, with up to 40% cover in places (Morgan, 2009; Ross, 2009; Ní Chatháin, 2010; NPWS, 2010).

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(macroalgae); macrophytes (rooted higher plants)		macrophytes: absent or trace (less than 5%)	Ross (2006) also recorded widespread and, in places, abundant (up to 80%) <i>Ranunculus</i> . Algae were generally absent in 2009, however up to 10% Cladophora cover was recorded downstream of Clonea Bridge (Ní Chatháin, 2010; NPWS, 2010), where sewage fungus had previously been recorded (Ross, 2006). Algae were also sparse in 2006 and 2016 (Ross, 2006; Ross <i>et al.</i> , 2017). Tree shade may be suppressing plant growth over much of the mussel habitat (Ross <i>et al.</i> , 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system.
Substratum quality: sediment	Occurrence	Restore substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The Clodiagh failed the target for the Sub-basin Management Plan in 2009 and 2016, with strong silt plumes recorded in mussel habitat (Ross, 2009; NPWS, 2010; Ross <i>et al.</i> , 2017). Ross <i>et al.</i> (2017) recorded extremely heavy silt plumes at every site, even in fast riffles. Ross (2006) recorded significant siltation of the mussel habitat and observed river bank erosion and collapse, and livestock entry to the river. Silt in the Clodiagh is providing a rooting medium for macrophytes. Sufficient survival of juvenile and adult mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Average redox was very poor, 23-28% at four sites monitored in 2016, only three of the 40 measurements was <20% (Ross <i>et al.</i> , 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Hydrological regime: flow variability	Metres per second	Maintain appropriate hydrological regime	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other key factor). To restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediment or growth of Zlgae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle; see Moorkens and Killeen (2014). Groundwater inflow to the substratum contributes to water-cycling. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of Clodiagh system.
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist <i>et al.</i> (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for mussels and a lack of mussel recruitment, while significantly lower host fish density and biomass were associated with high juvenile mussel numbers. Fish movements must be such that 0+ fish remain in the

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			mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. No glochidia were found on young Clodiagh fish in May 2009, although six trout and 38 salmon were caught (Johnston, 2009; NPWS, 2010).
Fringing habitat: area and condition	Hectares	Restore the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, particularly natural/semi-natural woodlands and wetlands, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats aid in the settlement of fine suspended matter, protect banks from erosion, contribute to nutrient cycling and to the aquatic food web (e.g. allochthonous matter such as leaf fall) and provide habitat for life-stages of fish, birds and aquatic invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers (e.g. along parts of the Clodiagh) and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
<b>White-clawed Crayfish (<i>Austropotamobius pallipes</i>)</b>	<b>To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Distribution	Occurrence	No reduction from baseline. See map 7	White-clawed crayfish ( <i>Austropotamobius pallipes</i> ) occurs extensively on the River Suir and on many of its tributaries. On the River Suir main channel, the species has been recorded on almost the entire length of non-tidal river from the most upstream point at Cabragh, near Thurles, to downstream of Kilsheelan. It is also present on the following tributaries: Anner and Iashawley, Clodiagh and Owenbeg, Multeen, Tar, Nier, and Clodiagh Lower
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries	See Reynolds <i>et al.</i> (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as a major direct threat to this species and as a disease vector. Ireland is currently free of non-native invasive crayfish species. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as a major threat and crayfish plague has occurred in Ireland even in the absence of alien vectors. Disease can, in some circumstances, be introduced through contaminated equipment and water in the absence of vector species. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No reduction in habitat heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles

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			and detritus, such as leaf litter. These conditions must be available on the whole length of occupied habitat
<b>Sea Lamprey (<i>Petromyzon marinus</i>)</b>	<b>To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:</b>		
<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas (Gargan <i>et al.</i> , 2011; Rooney <i>et al.</i> , 2015). Float-over surveys by Inland Fisheries Ireland (IFI) point to little success of sea lamprey adults in passing the weirs in Clonmel in Lower River Suir SAC. Modifications to these weirs would facilitate upstream passage of sea lamprey. IFI has embarked on a programme of detailed survey of major barriers in SAC catchments, in the context of sea lamprey passage, using the SNIFFER (Scotland and Northern Ireland Forum for Environmental Research) WFDIII methodology
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). A catchment wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Lampreys spawn in clean gravels. Substantial areas of suitable spawning habitat are available from Cahir to Carrick-on-Suir, but access to areas upstream of Clonmel is problematic
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King <i>et al.</i> , 2015). However, it is vital that such sedimenting habitats are retained
<b>Brook Lamprey (<i>Lampetra planeri</i>)</b>	<b>To restore the favourable conservation condition of Brook Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:</b>		
<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to lampreys' migration both up- and downstream, thereby possibly limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol <i>et al.</i> , 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between brook and

Lower River Suir SAC (002137)			
			river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Brook lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally (Rooney <i>et al.</i> , 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King <i>et al.</i> , 2015). However, it is vital that such sedimenting habitats are retained
<b>River Lamprey (<i>Lampetra fluviatilis</i>)</b>	<b>To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block river lampreys' migration both up- and downstream, thereby limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol <i>et al.</i> , 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). River lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally in numbers (Rooney <i>et al.</i> , 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater),	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King <i>et al.</i> , 2015). However, it is vital that such sedimenting habitats are retained



Lower River Suir SAC (002137)			
	downstream of spawning areas		
<b>Salmon (<i>Salmo salar</i>)</b>	<b>To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Suir is currently below CL, meeting 79% of CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers currently exceeding their conservation limit (CL). The average electrofishing value for the Suir in 2016 was 10.2 salmon fry, which is below the 17 fry target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice ( <i>Lepeophtheirus salmonis</i> )
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are generally not currently preventing salmon from accessing suitable spawning habitat in Lower River Suir SAC
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
<b>Otter (<i>Lutra lutra</i>)</b>	<b>To maintain the favourable conservation condition of Otter in Lower River Suir SAC, which is defined by the following list of attributes and targets:</b>		
Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid <i>et al.</i> 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 116.17ha above high water	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)

<b>Lower River Suir SAC (002137)</b>			
		mark (HWM) and 726.61ha along river banks	
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 712.27ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (Kruuk, 2006; NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 382.31km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid <i>et al.</i> , 2013) and wrasse and rockling in coastal waters (Kingston <i>et al.</i> , 1999)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

Sourced from NPWS (2017) *Conservation Objectives: Lower River Suir SAC 002137. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Publication dated 28/03/2017; Accessed online on 07/11/2017]

**4.4.3 Conservation Objectives of Slievefelim to Silvermines Mountains SPA (004165)****Table 14: Conservation Objectives of Slievefelim to Silvermines Mountains SPA (004165)**

Slievefelim to Silvermines Mountains SPA (004165)		
Hen	Harrier	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:
( <i>Circus cyaneus</i> )		

Sourced from NPWS (2016) *Conservation objectives for Slievefelim to Silvermines Mountains SPA [004165]. Generic Version 5.0.* Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Publication dated 15/08/2016; Accessed online on 07/11/2017]

**4.5 Evaluation of Impacts on Lower River Shannon SAC**

The Screening stage evaluated the potential for UWF Related Works to cause effects to the Lower River Shannon SAC via identified impact pathways (Sections 2.8 to 2.9). Potential for effects were identified with regard to individual Qualifying Interests designated within the SAC. These effects are evaluated further within the NIS, to determine whether the UWF Related Works project (either alone or in-combination) will affect the conservation status of these conservation interests, and thus the overall integrity of any European Site.

The evaluation of the UWF Related Works takes account of the following information in making a determination as to the character, magnitude and significance of effects:

The description of the UWF Related Works project, and its Project Design Measures, Best Practice Measures, Emergency Response Procedures, and Management Plans in respect of Waste, Surface Water and Invasive Species described in Section 3.2,

the descriptions of the other projects associated with the Whole UWF Project (including their Project Design Measures, Best Practice Measures, Emergency Response Procedures and Management Plans), provided in Section 3.3.1 to Section 3.3.4; and

the descriptions of the unrelated projects and any associated management plans, provided in Section 3.3.5.

**The Qualifying Interests and Potential Effects which were screened in for evaluation are listed in Table 15.**

**Table15: Qualifying Interest Screened In due to potential for UWF Related Works to cause effects**

European Site: Lower River Shannon SAC (002164)	
Qualifying Interest Screened Out due to no potential or likelihood of UWF Related Works causing any effects	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]
Potential Effects to Qualifying Interests	indirect habitat degradation effects in the downstream SAC indirect or ex-situ disturbance or displacement effects

**Indirect habitat degradation effects** are examined in the following order:

1. Riparian Habitat Degradation (Section 3.5.1)
2. Changes in Flow Regime (Section 3.5.2)
3. Decrease in habitat quality via: surface water runoff, sediment entrainment or release; release of fuels oils/ chemicals, surface/ ground water quality impacts (Section 3.5.3).

**Indirect or ex-situ disturbance or displacement effects** are examined in the following order:

1. Disturbance to Fisheries (Section 3.5.4)
2. Spread of Aquatic Invasive Species (Section 3.5.5)
3. Disturbance to Otter (Section 3.5.6)

**4.5.1 Lower River Shannon SAC: Riparian Habitat Degradation**

**Qualifying Interests:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260], Floating River Vegetation (3260), Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage:	Construction stage
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Potential Impact Source: Movement of soil, machinery; earthworks, excavations, overburden storage; sediment; instream works; new crossing structures; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage

Impact Pathway: water runoff flowpaths, watercourses, landcover

Impact Description: The riparian corridor along a watercourse relates to the interface between the aquatic habitat, the bankside vegetation and terrestrial environment. An intact, semi-natural riparian zone has significant beneficial services in the protection of instream aquatic habitat quality, food/nutrient contributions, and temperature regulation. Existing riparian habitat quality within the study area is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.

The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to affect the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species.

Project design: following works at or in close proximity to watercourses (Class 1 or Class 2), reinstatement works will be carried out which will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and replanting of riparian buffer zones with suitable native species to manage flood flows and buffer run-off.

**Evaluation of the Subject Development Impact – Riparian habitat degradation**

**UWF Related Works Impact**

Impact Magnitude:

Riparian habitat will be affected at **6 No.** watercourse crossings identified as having fisheries value, out of a total of 32 watercourse crossings within the construction works area boundary associated with the UWF Related Works.

The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off.

Riparian habitat impacts will be reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available.
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude: UWF Related Works will include 6 No. watercourse crossings evaluated as having fisheries value. Upperchurch Windfarm will also involve some access road construction work at 1 no. watercourse with fisheries value, this watercourse is one of the watercourses associated with UWF Related Works – and the trenching and ducting for UWF Related Works will take place during Upperchurch Windfarm access road construction and clear span bridge construction works at this location, thereby minimising cumulative impacts.

In relation to cumulative impacts with UWF Grid Connection, 1 no. watercourse of fisheries value may require culvert replacement works which would involve works in the riparian zone.

The spatial extent of such effects will occur within the footprint of the works within the riparian margins. Therefore, the zone of cumulative effects is limited to the footprint of the works areas identified at each crossing location, in-combination with other Project Elements affecting riparian habitat within the same waterbody.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available.
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

Impact Magnitude:

At Mountphilips Substation, construction works will take place within the riparian habitat zone of 2 no. watercourses, evaluated as having fisheries value. These works relate to 1 No. new permanent crossing and 1 No. temporary crossings

Of the 63 No. watercourse crossings along the 110kV UGC, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to instream works at potential culvert location works sites.

The effect on the riparian and bankside habitat will be greatest at these culvert replacement locations (31 No.), while the significance of such effects is greatest at watercourses supporting fisheries value (5 No.). The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure.

The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off. Riparian habitat impacts will be reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available.
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

**UWF Replacement Forestry**

Impact Magnitude: None

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- UWF Replacement Forestry is not located in the River Shannon catchment

**Upperchurch Windfarm**

Impact Magnitude:

As per the 2013 EIS, **1 No.** watercourse with fisheries value will be crossed. The crossing method will use using a clear span bridge design, which will avoid the requirement for instream works; however, works within the riparian zone will be required.

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- No requirement for instream works on fisheries value watercourses
- Limited scale of works within the riparian corridor at the 1 no. stream crossing – and this stream is not located in the River Shannon catchment
- All effects were evaluated as reversible and temporary in the short-term;
- Riparian habitats within the Upperchurch Windfarm which are directly affected by construction works were not identified as being of significant conservation value.

<b>UWF Other Activities</b>
Impact Magnitude: None
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No instream works or sediment creating activities adjacent to watercourses</li> <li>• No potential for disturbance effects due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses.</li> <li>• The Upperchurch Hen harrier Scheme is not located in the River Shannon catchment.</li> </ul>
<b>Evaluation of Other Cumulative Impacts – Riparian habitat degradation</b>
<b>Whole UWF Project Effect</b>
<p><u>Cumulative Impact Magnitude:</u></p> <p>Riparian habitat will be affected at <b>11 No.</b> watercourse crossings (1 no. watercourse is crossed by UWF Related Works and Upperchurch Windfarm at the same crossing point) identified as having fisheries value (one watercourse, WW2 associated with both the UWF Related Works and the Upperchurch Windfarm). The effect on the riparian and bankside habitat with implications for the structure and function of the habitat services with regard to aquatic ecological receptors has been evaluated as a Slight to Moderate adverse. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water. The spatial extent of such effects will occur within the footprint of the instream works, with the potential for direct impacts at the approach to watercourse crossing works areas.</p>
<b>Significance of the Effect: Not Significant</b>
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• The watercourse crossing works required for the 110kV UGC are largely located within the River Shannon catchment while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are largely located in the River Suir surface water catchment;</li> <li>• The limited extent of instream works, within defined works areas will reduce the potential spatial area.</li> <li>• The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;</li> <li>• Existing riparian habitat quality within the works areas is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.</li> <li>• Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available</li> <li>• The duration of the impact is evaluated with regard to the aquatic habitat services and buffering effects provided by riparian habitats at each discrete works location. Such impacts are limited to the specific works location and do not interact with riparian habitat communities within the watercourse as a whole, or at a catchment level, in view of cumulative or synergistic project effects. Riparian habitat impacts are once-off, restricted to the period of works within or adjacent to the aquatic habitat and are thus not subject to sequential project effects.</li> <li>• Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;</li> <li>• Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.</li> </ul>





**4.5.2 Lower River Shannon SAC: Changes in Flow Regime**

**Qualifying Interests:** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260], Floating River Vegetation (3260), Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage:	Construction stage
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Impact Source: Movement of soil, machinery; earthworks, excavations, overburden storage; sediment; instream works; new crossing structures; culvert replacement works.

Impact Pathway: water runoff flowpaths, watercourses, land cover

Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. Direct impacts are identified to channel morphology and geomorphology (bed and banks of watercourses) due to instream works and sediment deposition.

Aquatic species, which are likely to be present in fishery value watercourses at instream construction works locations, are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration (impassable barriers); and avoidance of channel constriction during low flow. Any change in watercourse morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities, which are likely to be present in fishery value watercourses at instream construction works locations, These communities are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration (impassable barriers); and avoidance of channel constriction during low flow.

Instream works are limited to the individual crossing points and include trenching works for underground cables, installation of temporary or permanent crossing structures and reinstatement works.

The reinstatement works will maintain the channel morphology, in line with IFI (2016) and will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.

The creation of adverse flow conditions or habitat limitations due to changes to flow or morphology will be limited to the specific works period within or adjacent to the aquatic habitat.

Project Design Measures include the use of culverts at all new permanent watercourse crossings which will be a minimum of 900mm in diameter and will be bottomless or clear spanning on all Class 1 and Class 2 type watercourse and the use of reinstatement of the banks and beds at crossing locations. In addition, in-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure).

**Evaluation of the Subject Development Impact – Changes to Flow Regime**

**UWF Related Works Impact**

Impact Magnitude:  
 There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works and in-stream works will be required at 25 no. of these locations. 26 no. of the total 32 no. crossings are located within the Clodiagh River catchment, 5 no. in the Owenbeg catchment and 1 no. in the

Bilboa catchment. Of these 32 no. crossings, 5 no. were evaluated as having fisheries potential (all in the Clodiagh River catchment, none in the Bilboa catchment).

Instream works in watercourses with fisheries value (5 No.) relate to 3 temporary crossings for Internal Windfarm Cabling trenching works and/or the installation of a temporary crossing structure, while the remaining 2 No. relate to the installation of permanent crossing structures.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);

The Class 1 and Class 2 watercourses where in-stream works are required are mostly small headwater streams; The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);

The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented in consultation with IFI.

The brief to temporary duration and reversibility of any effects.

**UWF Related Works In-Combination Impact**

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River catchments, and where UWF Related Works will include 5 No. watercourse crossings evaluated as having fisheries value and UWF Grid Connection may potentially require culvert replacement works on 1 no. Class 1 watercourses. Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to instream aquatic habitat quality will be negligible.

Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to flow regime will be negligible.

The spatial extent of such effects will occur within the footprint of the instream works or culvert replacement works, and also downstream within the zone of sediment transport. Where minor watercourse tributaries are crossed by the proposed works their contribution to downstream waterbodies is assessed collectively. Therefore, the zone of cumulative effects extends from watercourse crossing points lower end of any waterbody.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);

The Class 1 and Class 2 watercourses where in-stream works are required (5 No.) are mostly small headwater streams;

The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);

The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented in consultation with IFI.

- The brief to temporary duration and reversibility of any effects.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

Impact Magnitude: At Mountphilips Substation, instream works will be required at 1 no. watercourses with fisheries value (associated with the installation of permanent crossing structures). Changes to the flow regime will be long-term and permanent; alteration to flow morphology will be subject to Project Design Measures including the reinstatement of watercourses at crossing locations.

<p>Of the 63 No. watercourse crossings along the UWF Grid Connection 110kV UGC, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to <i>potential</i> culvert replacement works. The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure.</p> <p>At the 5 no. potential culvert replacement works locations, changes to the flow regime will be brief to temporary and for the duration of the immediate works, restricted to the location of the works area within the footprint of, or directly adjacent to the existing crossing point in the public road. Following the completion of construction works, changes to the flow regime will be long-term and permanent; alteration to flow morphology will be subject to Project Design Measures including the reinstatement of watercourses at crossing locations.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• In-stream works or culvert replacement works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);</li> <li>• The Class 1 and Class 2 watercourses where in-stream works are required are mostly small headwater streams;</li> <li>• The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);</li> <li>• The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented following consultation with IFI.</li> <li>• The brief to temporary duration and reversibility of any effects.</li> </ul>
<p><b>UWF Replacement Forestry</b></p>
<p>Impact Magnitude: None</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• UWF Replacement Forestry is not located in the River Shannon catchment</li> </ul>
<p><b>Element 4: Upperchurch Windfarm</b></p>
<p><u>Impact Magnitude:</u></p> <p>Construction works will take place in close proximity to 1 No. watercourses with fisheries value. No instream works are required at this location and this watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No instream works are required on the watercourse crossing within the Upperchurch Windfarm site</li> <li>• Implementation of the Sediment &amp; Erosion Control Plan</li> </ul>
<p><b>UWF Other Activities</b></p>
<p>Impact Magnitude: None</p>
<p>Significance of the Effect: Not Significant</p>

Rationale for Impact Evaluation:

- No instream works or sediment creating activities adjacent to watercourses

**Evaluation of In-Combination Impact – Changes to Flow Regime**

**Effect Of Whole UWF Project In-Combination with Other (unrelated) Projects**

Cumulative Impact Magnitude:

A potential decrease in aquatic habitat (via changes to flow regime) is identified at **10 No.** watercourse crossings where instream works or culvert replacement works are required within watercourses evaluated as having fisheries value – 5 no. for UWF Grid Connection and 5 no. for UWF Related Works. The spatial extent of such effects will occur within the footprint of the instream works, dispersed between two regional catchments and within several local sub-catchments.

**Significance of the Effect: Not Significant**

Rationale for Cumulative Impact Evaluation:

Instream works potentially affecting the flow regime are required at a limited number of locations; the majority of which require temporary works and a smaller sub-set require permanent instream structures.

Implementation of Project Design Measures at all watercourse crossing and instream works locations to minimize effects

Implementation of the sensitive crossing designs to be implemented in consultation with IFI. Provision of reinstatement works including: site-specific bank stabilization measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.

**4.5.3 Lower River Shannon SAC: Decrease in habitat quality via: surface water runoff, sediment entrainment or release; release of fuels oils/ chemicals, surface/ ground water quality impacts**

**Qualifying Interests:** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260], Floating River Vegetation (3260), Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage:	Construction stage
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Impact Source: Movement of soil, machinery; earthworks, excavations, overburden storage; sediment; instream works; new crossing structures; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brush storage; culvert replacement works.

Impact Pathway: water runoff flowpaths, watercourses, land cover, air

Impact Description: Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community.

Instream works at some watercourses will require direct excavation of the banks and bed of the watercourse, which can change the physical character of the watercourse and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic species. Although erosion and deposition are natural process in watercourses<sup>3</sup>, varying naturally throughout the year, additional sediment contributions entering the watercourse, such as from construction works adjacent to or upstream of individual watercourses, can have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels and mortality impacts for salmonid eggs (affecting recruitment) and invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

**Evaluation of the Subject Development Impact – Decrease in instream aquatic habitat quality**

**UWF Related Works Impact**

Impact Magnitude: There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works and in-stream works will be required at 25 no. of these locations. 26 no. of the total 32 no. crossings are located within the Clodiagh River catchment, 5 no. in the Owenbeg catchment and 1 no. in the Bilboa catchment. Of these 32 no. crossings, 5 No. watercourse crossings (all in the Clodiagh River catchment) were evaluated as having fisheries value.

The spatial extent of such effects will occur within the footprint of the instream works, and also downstream within the zone of sediment transport.

The effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character due to instream works has been evaluated as a Slight to Moderate adverse impact on availability, diversity and quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (taking account of instream works).

**Significance of the Effect: Not Significant**

<sup>3</sup> EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems,

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required (5 No.) are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works);
- The spatial extent of effects to the watercourse channel is limited to the footprint of the instream works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and
- Impacts to the watercourse channel are temporary and reversible with reinstatement.
- The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude:

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River catchments, and where UWF Related Works will include 5 No. watercourse crossings evaluated as having fisheries value and UWF Grid Connection may potentially require culvert replacement works on 1 no. Class 1 watercourses. Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to instream aquatic habitat quality will be negligible.

The spatial extent of such effects will occur within the footprint of the instream works or culvert replacement works, and also downstream within the zone of sediment transport. Where minor watercourse tributaries are crossed by the proposed works their contribution to downstream waterbodies is assessed collectively. Therefore, the zone of cumulative effects extends from the watercourse crossing points to the lower end of any waterbody

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- In-stream works or culvert replacement works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required (5 No. for UWF Related Works in the Clodiagh River) and culvert replacement works (1 no. for UWF Grid Connection in the Clodiagh River catchment and None in the Bilboa River catchment) are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works);
- The spatial extent of effects to the watercourse channel is limited to the footprint of the instream works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and
- Impacts to the watercourse channel are temporary and reversible with reinstatement.
- The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

General Impact Magnitude: Of the 63 No. watercourse crossings along the Grid Connection, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to *potential* culvert replacement works instream. The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure. The effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character due to instream works at potential culvert replacement locations has been evaluated as a Slight to Moderate adverse impact on availability, diversity and quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (Moderate impact taking account of instream works).

Specifically, in relation to the Newport River (see cumulative impacts with other Projects below): Approximately 4.3km of the 110kV UGC exists within the Newport River catchment (and Small River catchment) including the Mountphilips Substation site. Effects on surface water are likely to arise mainly from trench excavation at the terminal end of the route, as well as at watercourse crossings within the existing road corridor. There are 4 No. watercourse crossings (including haulage routes) within the Newport (and Small River) River catchment (W1-W4).

Specifically, in relation to the Clare River (see cumulative impacts with other Projects below): Approximately 11km of the 110kV UGC exists within the Clare River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings at existing road bridge and culvert locations. There are 30 no. watercourse crossings (including haulage routes) within the Clare River catchment (W5-W34).

Specifically, in relation to the Bilboa River (see cumulative impacts with other Projects below): Approximately 11.7km of the 110kV UGC exists within the Bilboa River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings at existing road bridge and culvert locations. There are 24 No. watercourse crossings within the Bilboa River catchment (W35-W58).

Specifically, in relation to the Clodiagh River (see cumulative impacts with other Projects below): Approximately 1.5km of the 110kV UGC exists within an upper headwater tributary of the Clodiagh River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings of one minor watercourse and small drains at existing road bridge and culvert locations. There are 5 No. watercourse crossings within the Clodiagh River catchment (W59-63).

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM's as provided in Appendix A7 of the EIA Report for UWF Related Works). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM's as provided in Appendix A7 of the EIA Report for UWF Grid Connection);
- The spatial extent of effects to the watercourse channel will occur within the footprint of any works at potential culvert replacement locations;
- The frequency of such an event is once of for any culvert replacement works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

Newport River catchment

- The watercourse crossings within the Newport River catchment requiring culvert replacement works (3 No.) are streams and therefore works will only be completed between the IFI permitted season of May and



<p>September (Project Design Measure), no instream works are required for the crossing of the Newport River (W4);</p> <ul style="list-style-type: none"> <li>● It's likely only between 100 – 200m of the trench will be excavated in any day with only 1– 2 watercourse crossings being completed in any one day (assumed 1 - 2 work crews);</li> <li>● All effects will be brief to temporary in nature and reversible.</li> </ul> <p><u>Clare River catchment:</u></p> <ul style="list-style-type: none"> <li>● The majority of the watercourse crossings (24 of 30 No.) within the catchment have low / no fisheries value (Class 3 and Class 4 watercourses) and therefore the potential for downstream water quality effects is limited due to small size and low or absent flows;</li> <li>● Watercourse crossings at potential culvert replacement locations which may require instream works at Class 1 watercourses (W9 and W33) will only be completed between the IFI permitted season of July to September (Project Design Measure), no instream works are required at the crossing of the Clare (Annagh) River (W31), as works will be within the existing bridge structure;</li> <li>● It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings being completed in any one day (assumed 1 -2 work crews); and,</li> <li>● The short-term, temporary nature of the works within the catchment;</li> <li>● All effects will be brief to temporary in nature and reversible.</li> </ul> <p><u>Bilboa River catchment:</u></p> <ul style="list-style-type: none"> <li>● The majority of the watercourse crossings (21 of 24 No.) within the catchment have low / no fisheries value (Class 3 and Class 4 watercourses) and therefore the potential for downstream water quality effects is limited due to small size and low or absent flows;</li> <li>● There are no instream works or culvert replacement works required at watercourse crossings at Class 1 watercourses (W40, W44 and W48), all works will be within the existing bridge structures;</li> <li>● It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings (no crossing works) being completed in any one day (assumed 1 -2 work crews); and,</li> <li>● The short-term, temporary nature of the works within the catchment;</li> <li>● All effects will be brief to temporary in nature and reversible.</li> </ul> <p><u>Clodiagh River catchment:</u></p> <ul style="list-style-type: none"> <li>● All watercourse crossings (5 No.) are within a single headwater tributary of the upper Clodiagh sub-catchment. The majority of these crossings (4 of 5 No.) have no fisheries value (Class 4 watercourses). Only 1 No. crossing of a Class 2 first order stream is required; therefore, the potential for downstream water quality effects is limited due to small size and low or absent flows;</li> <li>● Watercourse crossings comprising potential culvert replacement works instream at the Class 2 watercourse (W60) will only be completed between the IFI permitted season of July to September (Project Design Measure);</li> <li>● It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings (4 out of 5 with no culvert replacement works) being completed in any one day (assumed 1 -2 work crews); and,</li> <li>● The short-term, temporary nature of the works within the catchment;</li> <li>● All effects will be brief to temporary in nature and reversible.</li> </ul>
<p><b>UWF Replacement Forestry</b></p>
<p>Impact Magnitude: None</p> <p>UWF Replacement Forestry is not located in the River Shannon catchment.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>● UWF Replacement Forestry is not located in the River Shannon catchment</li> </ul>
<p><b>Upperchurch Windfarm</b></p>
<p><u>Impact Magnitude:</u> There is 1 no. watercourse crossing within the Upperchurch Windfarm Site, evaluated as having fisheries value (Class 1, WW2). This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Baseline conditions indicated that the aquatic species were present year-round, and impacts were evaluated as being of high magnitude for aquatic species. However, it was identified</p>

that significant impacts were not probable/likely post-mitigation. The 2013 EIS concludes that water quality effects will not be significant
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required;</li> <li>• All effects were evaluated as reversible and temporary in the short-term and impacts were associated with construction phase works.</li> </ul>
<b>Element 5: UWF Other Activities</b>
Impact Magnitude: None
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <p>No instream works or sediment creating activities adjacent to watercourses</p> <p>No potential for impacts to aquatic habitats due to tree felling, as no tree felling of conifer plantations is required</p>
<b>Other Project: Consented Bunkimalta Windfarm</b>
<p><u>Impact Magnitude:</u> Clare River catchment: 5 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Clare River catchment.</p> <p>Newport River catchment: 11 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Newport River catchment</p>
<u>Significance of the Impact:</u> Not Significant
<p><u>Rationale for Impact Evaluation:</u> As per Bunkimalta WF EIS (2013)</p> <ul style="list-style-type: none"> <li>• Construction activities will be at least a minimum of 50m where possible;</li> <li>• A Sediment Control Plan will be put in place during the construction phase to control runoff.</li> </ul>
<b>Evaluation of Other Cumulative Impacts – Decrease in instream aquatic habitat quality</b>
<b>Whole UWF Project Effect</b>
<p><u>Cumulative Impact Magnitude:</u> For the Whole UWF Project, a potential decrease in aquatic habitat quality is identified at a total of <b>10 No.</b> watercourse crossings where instream works are required within watercourses evaluated as having fisheries value – 5 no. for UWF Grid Connection, and 5 no. for UWF Related Works. The spatial extent of such effects will occur within the footprint of the instream works, dispersed between two regional catchments and within several local sub-catchments. Impact range is located downstream of the lowest point in the waterbody where Whole UWF Project works are required, with reference to the zone of sediment transport.</p>
<b>Significance of the Effect: Not Significant</b>
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• The watercourse crossing works required for the UWF Grid Connection (110kV UGC) (63 No. total) are largely located within the River Shannon catchment (58 No.) while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are largely located in the River Suir surface water catchment;</li> <li>• The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species within the affected catchments downstream.</li> <li>• The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,</li> <li>• The frequency and duration is limited to the specific works period within or adjacent to the aquatic habitat.</li> <li>• Impacts at the works site are temporary; however, downstream siltation effects are short-term and not reversible.</li> </ul>

**All Elements of the Whole UWF Project with Other Projects or Activities**Cumulative Impact Magnitude:

In relation to cumulative effects within the Clare River catchment; Approximately 11km of the 110kV UGC exists within the Clare River catchment and 5 No. of the 16 No. consented Bunkimalta Windfarm turbines are located within the Clare River catchment.

In relation to cumulative effects within the Newport River catchment; Approximately 4.3km of the 110kV UGC exists within the Newport River catchment including the Mountphilips Substation site, along with 11 No. of the 16 No. consented Bunkimalta Windfarm turbines.

**Significance of the Effect: Not Significant**Rationale for Cumulative Impact Evaluation:Clare River:

- The relatively small number of the Bunkimalta Windfarm turbines within the Clare River catchment;
- The relatively large surface water catchment area of the Clare River – 71km<sup>2</sup>;
- The short-term temporary nature of the 110kV UGC works within the Clare River catchment, limited to 2 No. crossings of watercourses with fisheries value (Class 1 / Class 2).

Newport River

- The relatively small scale of the 110kV UGC works within the Newport River catchment (4.3km of temporary access roads);
- The large surface water catchment area of the Newport River catchment – 126km<sup>2</sup>;
- The relatively large upstream distance of the Bunkimalta Windfarm site (~10km) from the 110kV works;
- The temporary and short-term nature of the proposed 110kV UGC works within the Newport River catchment, limited to 2 No. crossings of watercourses with fisheries value (Class 1 / Class 2);
- Sediment Control Plans will be in place at the Bunkimalta Windfarm

**4.5.4 Lower River Shannon SAC: Disturbance to Fisheries**

**Qualifying Interests:** Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage: Construction stage

Impact Source: Instream works; Operating machinery; Excavation works; Noise and human disturbance; Reinstatement

Cumulative Impact Source: Operating machinery; Excavation works; Noise and human disturbance; Reinstatement

Impact Pathway: Surface water; Direct contact; Ground and air vibrations

Impact Description: Instream works and machinery operation within or in close proximity to any watercourse has the potential to directly disturb or displace salmonid fish and aquatic species within fish-bearing streams, or sensitive aquatic receptors such as white-clawed crayfish. Fish are likely to mobilise outside of their territories due to human disturbance, but will return once the disturbance effect diminishes. Aquatic invertebrates are less sensitive to disturbance and displacement arising from human activity and are scoped out from evaluation of disturbance/displacement effects. The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations – i.e. Class 1 or Class 2 watercourses. Disturbance or displacement effects will be brief to temporary in nature, lasting for the duration of works at or in close proximity to Class 1 or Class 2 watercourses.

**Evaluation of the Subject Development Impact – Disturbance or Displacement**

**UWF Related Works Impact**

Impact Magnitude:  
 Of the 32 No. watercourse crossings within the UWF Related Works construction works area boundary, 6 No. have been evaluated to have fisheries value. Of these 6 No. watercourses, 5 No. will be subject to instream works (the remaining 1 no. crossing WW2 will use a clear span structure with no requirement for instream works). Any fish present are likely to be affected for between 1 – 2 days during instream works. The frequency of these disturbance effects is once for half of the locations (cables trenches with or without new permanent culverts) and twice for the remaining locations (temporary culverts (once for installation and once for removal)).

**Significance of the Effect: Not Significant**

- Rationale for Impact Evaluation:
- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
  - The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
  - The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
  - There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
  - The singular frequency of any disturbance events at half of the locations, and;

- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude:

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River and to a lesser extent, Bilboa River catchments. UWF Related Works will require works in close proximity to 6 no. watercourses with fisheries value, and instream works at 5 no. of these watercourses (Clodiagh River, in Suir catchment). Upperchurch Windfarm will require works in close proximity to 1 no. watercourse in the Clodiagh River catchment (construction of a clear span bridge (no instream works) at this location). UWF Grid Connection (110kV UGC) will require works in close proximity to 4 no. watercourses within the Bilboa River catchment and in close proximity to 1 no. watercourse crossing (with potential for culvert replacement works at this crossing) in the Clodiagh River catchment.

UWF Replacement Forestry will involve works in proximity to a Class 1 watercourse in the Clodiagh River catchment, with planting carried out by hand at the site, it is therefore evaluated that any cumulative impacts will be negligible.

The spatial extent of cumulative disturbance or displacement effects is localised at each crossing location–

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
- The singular frequency of any disturbance events at half of the locations, and;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

Impact Magnitude:

At Mountphilips Substation, works will take place in close proximity to 2 no. watercourses with fisheries value, of these 2 no. will be subject to instream works.

Along the 110kV UGC, there are 63. No. watercourse crossings, of which 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. may be subject to culvert replacement works. The remaining crossings identified as having fisheries value (8 No.), including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure. Proposed works including trench excavation, bridge works, culvert replacement, and resurfacing may give rise to disturbance to fish and aquatic biodiversity

receptors present within Class 1 and Class 2 watercourses over a period of 1 – 2 days at each crossing location. The frequency of these disturbance effects is once for cables trenches with or without new permanent culverts. The remaining crossings are over existing crossing structures which do not require any works and cables will be installed either under or over the structure, disturbance effects at these locations are therefore evaluated as Imperceptible.

Significance of the Effect: Not Significant

- Rationale for Impact Evaluation:
- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
  - The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
  - The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
  - There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM’s as provided Appendix A7 of the EIA Report for UWF Related Works);
  - The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any potential culvert replacement works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations.
  - The frequency of disturbance effects will be once for all cables trenches where instream works are required, installed at crossing locations with or without new permanent culverts
  - The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

**UWF Replacement Forestry**

Impact Magnitude: None

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:  
 UWF Replacement Forestry is not located in the River Shannon catchment

**Upperchurch Windfarm**

Impact Magnitude: None:  
**1 No.** watercourse with fisheries value occurs within the footprint of the Upperchurch Windfarm site. This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Disturbance effects are limited to the construction works for the new bridge along with the subsequent use of the new bridge throughout the construction period.

Significance of the Effect: Not Significant

- Rationale for Impact Evaluation:
- The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species; however, it was identified that significant impacts were not probable/likely post-mitigation. A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required; disturbance will be limited to the immediate works area.

<b>UWF Other Activities</b>
Impact Magnitude: None
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <p>No potential for disturbance effects due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses.</p>
<b>Bunkimalta Windfarm – <i>Screened Out</i>: no potential for in-combination effects</b>
<b>Evaluation of Other Cumulative Impacts – Disturbance or Displacement</b>
<b>Whole UWF Project Effect</b>
<p><u>Cumulative Impact Magnitude:</u></p> <p>Direct disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement works and directly upstream and downstream of all crossings, temporary and permanent instream works structures and bank-side works. The watercourse crossings are dispersed between two regional catchments and within several local sub-catchments. In total there are <b>10 No.</b> instream works locations where crossings of fish-bearing streams are required, all of which will be sensitive to disturbance. However, at the local level in the context of individual receptors, temporary displacement will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Additional disturbance effects within the watercourse channel will be limited to the spatial extent of trenching and ducting activities.</p>
<b>Significance of the Effect: Not Significant</b>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>● In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);</li> <li>● The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);</li> <li>● The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);</li> <li>● There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);</li> <li>● The frequency of disturbance effects will be once for all cables trenches at crossing locations with or without potential culvert replacement; and</li> <li>● The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.</li> </ul>

**4.5.5 Lower River Shannon SAC: Spread of Aquatic Invasive Species**

**Qualifying Interests:** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260], Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage: Construction stage

Impact Source: Instream works; Excavation works

Cumulative Impact Source: Instream works; culvert replacement works, Excavation works

Impact Pathway: Surface water; Movement of soils and machinery

Impact Description: Invasive aquatic species include non-native, invasive flora and also fish and invertebrate fauna. Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses during the course of instream works or transported via excavation material by site machinery. Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or affecting significant habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream and downstream within a watercourse, potentially extending throughout the catchment.

**Evaluation of the Subject Development Impact – Spread of Aquatic Invasive Species**

**UWF Related Works Impact**

Impact Magnitude:

There is the potential for introduction of non-native, invasive aquatic species at all **32 No.** watercourse crossings associated with the UWF Related Works.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species is evaluated as non-reversible.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at all **32 No.** watercourse crossings in the Clodiagh and Bilboa river catchments associated with the UWF Related Works, the affected watercourses may be further exposed to cumulative risk of spread or introduction from Upperchurch Windfarm construction traffic and works in proximity to some of the watercourse crossings, and works in proximity to an additional 29 no. watercourse crossing locations associated with UWF Grid Connection with the Clodiagh and Bilboa river catchments.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.



<ul style="list-style-type: none"> <li>● In this respect, the spread of aquatic invasive species is evaluated as non-reversible.</li> </ul>
<p><b>Cumulative Information: Individual Evaluations of Other Projects</b></p>
<p><b>UWF Grid Connection</b></p>
<p><u>Impact Magnitude:</u> There is the potential for introduction of non-native, invasive aquatic species at all <b>63 No.</b> watercourse crossings associated with the Mountphilips Substation and 110kV UGC works.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>● The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.</li> <li>● In this respect, spread of aquatic invasive species is evaluated as non-reversible.</li> </ul>
<p><b>UWF Replacement Forestry</b></p>
<p>Impact Magnitude: None</p>
<p>Significance of the Effect: Not Significant</p>
<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> <li>● UWF Replacement Forestry is not located in the River Shannon catchment.</li> </ul>
<p><b>Upperchurch Windfarm</b></p>
<p><u>Impact Magnitude:</u> There is the potential for introduction of non-native, invasive aquatic species at the <b>1 No.</b> watercourse crossing associated with the Upperchurch Windfarm works.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>● The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species, in the absence of mitigation. However, it was identified that significant impacts were not probable/likely.</li> <li>● Baseline conditions indicated that the aquatic species were present year-round and impacts were associated with construction phase works.</li> <li>● All effects were evaluated as reversible and temporary in the short-term; however, in the case of potential spread of aquatic invasive species, there is the potential for long-term, irreversible impacts</li> </ul>
<p><b>UWF Other Activities</b></p>
<p>Impact Magnitude: None</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u> No potential for impacts to aquatic habitat quality arising from the spread of invasive species, as there are no instream works or activities adjacent to watercourses required as a result of UWF Other Activities</p>
<p><b>Bunkimalta Windfarm – Screened Out:</b> no potential for in-combination effects</p>

**Evaluation of Other Cumulative Impacts – Spread of Aquatic Invasive Species****Whole UWF Project Effect**Cumulative Impact Magnitude:

There is the potential for introduction of non-native, invasive aquatic species at the **96 No.** watercourse crossing associated with the Whole UWF Project (1 no. occur on both the UWF Related Works and the Upperchurch Windfarm and 1 no. occurs on both the UWF Related Works and the UWF Grid Connection).

**Significance of the Effect: Not Significant**Rationale for Cumulative Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species are evaluated as non-reversible

**4.5.6 Lower River Shannon SAC: Disturbance to Otter**

**Qualifying Interests: Otter [1355]**

Project Life Cycle Stage:	Construction stage
<u>Impact Source:</u> Construction Noise and Visual Intrusion	
<u>Cumulative Impact Source:</u> Noise and Visual Intrusion	
<u>Impact Pathway:</u> Air and visibility	
<p><u>Impact Description:</u> Otter are rated as a very high sensitivity receptor (based on International importance ratings) and do not tolerate disturbance at or near holts (breeding dens) that are in active use (breeding may occur at any time of the year, but most likely during the period). As no active holts were located within 150m (upstream or downstream) of works locations (i.e. watercourse crossings) then effects are reduced to disturbance/displacement of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors. This could include the disturbance of animals at resting places (couches).</p> <p>These effects are reduced by an adherence to completing works during daylight hours only as part of Project Design. However watercourses are present which form part of or are hydrologically connected to European Sites (cSAC's) which include Otter as a Qualifying Interest. Significant effects on Otter from displacement resulting from noise or visual intrusion may therefore affect in turn the integrity of these designated site(s).</p>	

**Evaluation of the Subject Development Impact – Otter: Disturbance/Displacement**

**UWF Related Works Impact**

Impact Magnitude: 32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings. Due to 75% of these watercourses being drains or marginal watercourses, and the absence of otter holts within 150m of the crossing points, impact magnitude is expected to be Negligible

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- No active holts were identified overlapping the construction area boundaries or within 150m, and;
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration.
- Application of project design measures for the protection of Otter,

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude: The potential for cumulative effects relates to the in-combination effects of UWF Related Works and Upperchurch Windfarm and to a lesser extent of UWF Related Works with Upperchurch Windfarm and UWF Grid Connection. However, as the majority of watercourses crossings associated with these Projects within the Cumulative Evaluation Study Area are drains or of marginal ecological value, and the absence of otter holts within 150m of works areas, the cumulative impact magnitude is expected to be Negligible.

Cumulative effects with UWF Replacement Forestry will be negligible due to the separation distance between UWF Related Works and UWF Replacement Forestry, and the absence of otter on UWF Replacement Forestry site. There is no potential for Other Projects to cause cumulative effects to Otter with UWF Related Works.

<p><b>Significance of the Effect: Not Significant</b></p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No active holts within 150m of watercourse crossing locations;</li> <li>• Works will take place during daylight hours only, and;</li> <li>• Be of brief-temporary duration.</li> <li>• Application of project design measures for the protection of Otter.</li> </ul>
<p><b>Cumulative Information: Individual Evaluations of Other Projects</b></p>
<p><b>UWF Grid Connection</b></p>
<p><u>Impact Magnitude:</u> There were four records of Otter within the UWF Grid Connection study area, consisting of paths, slides, tracks and spraints. Two of the four records, which were from the Tooreenbrien Lower River, and consisted of a spraint found approximately 50m downstream of the watercourse crossing, and a print found on a ledge underneath the bridge arch. The remaining records are from the Bilboa River and the Annagh River, consisting of a single slide at each location. No active breeding or resting sites (Holts or Couches) were identified, however. No Otters were observed, although this is typical in respect of a species where most activity takes place at night.</p> <p>Out of the 63 identified watercourse crossings along the UWF Grid Connection route, 15 watercourses were identified from photographs taken during a preliminary survey of all watercourse crossing locations, as having potential to support Otter and were therefore surveyed 150m upstream and downstream of the crossing for the presence of Otter. Out of these 15 watercourses surveyed, evidence of Otter was found at three watercourse crossings. No active breeding or resting sites (Holts or Couches) were identified, however.</p> <p>Considering the brief duration of works at watercourse crossings and the small scale of the proposed works the magnitude of impact in relation to disturbance of Otter is expected to be slight.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• The implementation of Additional Mitigation Measure AMM-01:Disturbance to or displacement of Otter – see UWF Grid Connection EIA Report</li> <li>• The very high sensitivity rating of the species, and;</li> <li>• Recorded Otter evidence in close proximity to the identified crossings, notwithstanding;</li> <li>• Works will take place during daylight hours, and;</li> <li>• The brief-temporary duration of disturbance events, with</li> <li>• Project design measures to avoid/reduce effects also in place.</li> </ul>
<p><b>UWF Replacement Forestry</b></p>
<p><u>Impact Magnitude:</u> None</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• UWF Replacement Forestry is not located in the River Shannon catchment;</li> <li>• Any effect will be reversible, given the low magnitude of source disturbance.</li> </ul>
<p><b>Upperchurch Windfarm</b></p>
<p><u>Impact Magnitude:</u> None</p>

Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u> No Otter were recorded and hence disturbance effects were not scoped in for evaluation.</p>
<b>UWF Other Activities</b>
<u>Impact Magnitude:</u> Negligible
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No otter holts or resting places were recorded at Haul Route Activity locations, and;</li> <li>• Locations of Overhead Line Activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours;</li> <li>• The offsetting effects of long term management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing Otter habitat – including the enhancement of riparian corridors.</li> <li>• The low reversibility of the above described management.</li> </ul>
<b>Bunkimalta Windfarm – Screened Out:</b> no potential for in-combination effects
<b>Evaluation of Other Cumulative Impacts – Otter: Disturbance/Displacement</b>
<b>Whole UWF Project Effect</b>
<p><u>Cumulative Impact Magnitude:</u> Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur across a c.30km wide area within the River Shannon and River Suir catchments. There is potential to cause disturbance or displacement of otter at larger watercourse crossing points. These larger watercourses occur along the UWF Grid Connection, whereas the watercourses on the UWF Related Works and Upperchurch Windfarm sites are mainly drains and larger drains/watercourses with marginal habitat value to otter.</p> <p>In relation to in-combination effects of the whole project, there is no potential for cumulative additive effects to Otters from both the UWF Related Works and the Upperchurch Windfarm due to the absence of Otter recorded at the watercourses within these sites. There is no potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the Neutral effect of UWF Replacement Forestry. The in combination effect of the whole project, where considered in its entirety is in the order of Project Element 1 i.e. the Grid Connection. In total 3 no. watercrossing points along the public road had signs of Otter use within 300m, the nearest of these crossing points is separated from UWF Related Works and Upperchurch Windfarm by ca.6km, therefore there is no likelihood of additive cumulative effects to individual Otters from both the UWF Grid Connection works and UWF Related Works or Upperchurch Windfarm works.</p>
<b>Significance of the Effect: Not Significant</b>
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• Notwithstanding the separation distances between the 3 no. watercourse crossing locations along the UWF Grid Connection and the watercourse crossing locations associated with the UWF Related Works and Other Elements, and</li> <li>• The absence of Otter records at the UWF Related Works, UWF Replacement Forestry and UWF study areas, and</li> <li>• Works will take place during daylight hours, and;</li> <li>• Be brief-temporary in duration;</li> </ul>

- Recorded evidence of Otter in close proximity, and
- Best Practice measures to be implemented.



**4.6 Evaluation of Impacts on Lower River Suir SAC**

The Screening stage evaluated the potential for UWF Related Works to cause effects to the Lower River Suir SAC via identified impact pathways (Sections 2.8 to 2.9). Potential for effects were identified with regard to individual Qualifying Interests designated within the SAC. These effects are evaluated further within the NIS, to determine whether the UWF Related Works project (either alone or in-combination) will affect the conservation status of these conservation interests, and thus the overall integrity of any European Site.

The evaluation of the UWF Related Works takes account of the following information in making a determination as to the character, magnitude and significance of effects:

The description of the UWF Related Works project, and its Project Design Measures, Best Practice Measures, Emergency Response Procedures, and Management Plans in respect of Waste, Surface Water and Invasive Species described in Section 3.2,

the descriptions of the other projects associated with the Whole UWF Project (including their Project Design Measures, Best Practice Measures, Emergency Response Procedures and Management Plans), provided in Section 3.3.1 to Section 3.3.4; and

the descriptions of the unrelated projects and any associated management plans, provided in Section 3.3.5.

**The Qualifying Interests and Potential Effects which were screened in for evaluation are listed in Table 16.**

**Table16: Qualifying Interest Screened In due to potential for UWF Related Works to cause effects**

European Site: Lower River Suir SAC (002137)	
Lower River Suir SAC	Alluvial Forests (91E0)* (priority habitat) <i>Taxus baccata</i> woods of the British Isles [91J0] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260] Freshwater Pearl Mussel [1029] White-clawed Crayfish [1092] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106] Otter [1355]
Potential Effects to Qualifying Interests	Indirect habitat degradation effects in the downstream SAC Indirect or ex-situ disturbance or displacement effects

**Indirect habitat degradation effects** are examined in the following order:

1. Riparian Habitat Degradation (Section 3.6.1)
2. Changes in Flow Regime (Section 3.6.2)
3. Decrease in habitat quality via: surface water runoff, sediment entrainment or release; release of fuels oils/ chemicals, surface/ ground water quality impacts (Section 3.6.3).

**Indirect or ex-situ disturbance or displacement effects** are examined in the following order:

1. Disturbance to Fisheries (Section 3.6.4)
2. Spread of Aquatic Invasive Species (Section 3.6.5)
3. Disturbance to Otter (Section 3.6.6)



**4.6.1 Lower River Suir SAC: Riparian Habitat Degradation**

**Qualifying Interests:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260], Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage:	Construction stage
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Potential Impact Source: Movement of soil, machinery; earthworks, excavations, overburden storage; sediment; instream works; new crossing structures; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brush storage

Impact Pathway: water runoff flowpaths, watercourses, landcover

Impact Description: The riparian corridor along a watercourse relates to the interface between the aquatic habitat, the bankside vegetation and terrestrial environment. An intact, semi-natural riparian zone has significant beneficial services in the protection of instream aquatic habitat quality, food/nutrient contributions, and temperature regulation. Existing riparian habitat quality within the study area is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.

The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to impact on the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species.

Project design: following works at or in close proximity to watercourses (Class 1 or Class 2), reinstatement works will be carried out which will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and replanting of riparian buffer zones with suitable native species to manage flood flows and buffer run-off.

**Evaluation of the Subject Development Impact – Riparian habitat degradation**

**UWF Related Works Impact**

Impact Magnitude:  
Riparian habitat will be affected at **6 No.** watercourse crossings identified as having fisheries value, out of a total of 32 watercourse crossings within the construction works area boundary associated with the UWF Related Works.

The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off.

Riparian habitat impacts will be reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available.
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude: UWF Related Works will include 6 No. watercourse crossings evaluated as having fisheries value. Upperchurch Windfarm will also involve some access road construction work at 1 no. watercourse with fisheries value, this watercourse is one of the watercourses associated with UWF Related Works – and the trenching and ducting for UWF Related Works will take place during Upperchurch Windfarm access road construction and clear span bridge construction works at this location, thereby minimising cumulative impacts.

In relation to cumulative impacts with UWF Grid Connection, 1 no. watercourse of fisheries value may require culvert replacement works which would involve works in the riparian zone.

The spatial extent of such effects will occur within the footprint of the works within the riparian margins. Therefore, the zone of cumulative effects is limited to the footprint of the works areas identified at each crossing location, in-combination with other Project Elements affecting riparian habitat within the same waterbody.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available.
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

Impact Magnitude:

At Mountphilips Substation, construction works will take place within the riparian habitat zone of 2 no. watercourses, evaluated as having fisheries value. These works relate to 1 No. new permanent crossing and 1 No. temporary crossings

Of the 63 No. watercourse crossings along the 110kV UGC, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to instream works at potential culvert location works sites. The effect on the riparian and bankside habitat will be greatest at these culvert replacement locations (31 No.), while the significance of such effects is greatest at watercourses supporting fisheries value (5 No.). The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure.

The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off. Riparian habitat impacts will be reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available.
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

**UWF Replacement Forestry**

Impact Magnitude: None

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- No requirement for instream works on fisheries value watercourses
- 10m set back from 1 no. stream crossing
- Planting by hand

**Upperchurch Windfarm**

Impact Magnitude:

As per the 2013 EIS, **1 No.** watercourse with fisheries value will be crossed. The crossing method will use using a clear span bridge design, which will avoid the requirement for instream works; however, works within the riparian zone will be required.

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- No requirement for instream works on fisheries value watercourses
- Limited scale of works within the riparian corridor at the 1 no. stream crossing

<ul style="list-style-type: none"> <li>• All effects were evaluated as reversible and temporary in the short-term;</li> <li>• Riparian habitats within the Upperchurch Windfarm which are directly affected by construction works were not identified as being of significant conservation value.</li> </ul>
<p><b>UWF Other Activities</b></p>
<p>Impact Magnitude: None</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No instream works or sediment creating activities adjacent to watercourses</li> <li>• No potential for disturbance effects due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses.</li> <li>• The Upperchurch Hen harrier Scheme will include planting of 1.4km of woody scrub species along riparian corridors and fencing of watercourse corridors to prevent access to the watercourses by livestock, which will enhance the quality of riparian habitats.</li> </ul>
<p><b>Evaluation of Other Cumulative Impacts – Riparian habitat degradation</b></p>
<p><b>Whole UWF Project Effect</b></p>
<p><u>Cumulative Impact Magnitude:</u></p> <p>Riparian habitat will be affected at <b>11 No.</b> watercourse crossings (1 no. watercourse is crossed by UWF Related Works and Upperchurch Windfarm at the same crossing point) identified as having fisheries value (one watercourse, WW2 associated with both the UWF Related Works and the Upperchurch Windfarm). The effect on the riparian and bankside habitat with implications for the structure and function of the habitat services with regard to aquatic ecological receptors has been evaluated as a Slight to Moderate adverse. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water. The spatial extent of such effects will occur within the footprint of the instream works, with the potential for direct impacts at the approach to watercourse crossing works areas.</p>
<p><b>Significance of the Effect: Not Significant</b></p>
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• The watercourse crossing works required for the 110kV UGC are largely located within the River Shannon catchment while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are largely located in the River Suir surface water catchment;</li> <li>• The limited extent of instream works, within defined works areas will reduce the potential spatial area.</li> <li>• The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;</li> <li>• Existing riparian habitat quality within the works areas is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.</li> <li>• Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available</li> <li>• The duration of the impact is evaluated with regard to the aquatic habitat services and buffering effects provided by riparian habitats at each discrete works location. Such impacts are limited to the specific works location and do not interact with riparian habitat communities within the watercourse as a whole, or at a catchment level, in view of cumulative or synergistic project effects. Riparian habitat impacts are once-off, restricted to the period of works within or adjacent to the aquatic habitat and are thus not subject to sequential project effects.</li> </ul>

- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

**4.6.2 Lower River Suir SAC: Changes in Flow Regime**

**Qualifying Interests:** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260], Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage:	Construction stage
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Impact Source: Movement of soil, machinery; earthworks, excavations, overburden storage; sediment; instream works; new crossing structures; culvert replacement works.

Impact Pathway: water runoff flowpaths, watercourses, land cover

Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. Direct impacts are identified to channel morphology and geomorphology (bed and banks of watercourses) due to instream works and sediment deposition.

Aquatic species, which are likely to be present in fishery value watercourses at instream construction works locations, are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration (impassable barriers); and avoidance of channel constriction during low flow. Any change in watercourse morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities, which are likely to be present in fishery value watercourses at instream construction works locations, These communities are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration (impassable barriers); and avoidance of channel constriction during low flow.

Instream works are limited to the individual crossing points and include trenching works for underground cables, installation of temporary or permanent crossing structures and reinstatement works.

The reinstatement works will maintain the channel morphology, in line with IFI (2016) and will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.

The creation of adverse flow conditions or habitat limitations due to changes to flow or morphology will be limited to the specific works period within or adjacent to the aquatic habitat.

Project Design Measures include the use of culverts at all new permanent watercourse crossings which will be a minimum of 900mm in diameter and will be bottomless or clear spanning on all Class 1 and Class 2 type watercourse and the use of reinstatement of the banks and beds at crossing locations. In addition, in-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure).

**Evaluation of the Subject Development Impact – Changes to Flow Regime**

**UWF Related Works Impact**

Impact Magnitude:  
 There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works and in-stream works will be required at 25 no. of these locations. 26 no. of the total 32 no. crossings are located within the Clodiagh River catchment, 5 no. in the Owenbeg catchment and 1 no. in the

Bilboa catchment. Of these 32 no. crossings, 5 no. were evaluated as having fisheries potential (all in the Clodiagh River catchment, none in the Bilboa catchment).

Instream works in watercourses with fisheries value (5 No.) relate to 3 temporary crossings for Internal Windfarm Cabling trenching works and/or the installation of a temporary crossing structure, while the remaining 2 No. relate to the installation of permanent crossing structures.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);

The Class 1 and Class 2 watercourses where in-stream works are required are mostly small headwater streams; The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);

The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented in consultation with IFI.

The brief to temporary duration and reversibility of any effects.

**UWF Related Works In-Combination Impact**

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River catchments, and where UWF Related Works will include 5 No. watercourse crossings evaluated as having fisheries value and UWF Grid Connection may potentially require culvert replacement works on 1 no. Class 1 watercourses. Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to instream aquatic habitat quality will be negligible.

Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to flow regime will be negligible.

The spatial extent of such effects will occur within the footprint of the instream works or culvert replacement works, and also downstream within the zone of sediment transport. Where minor watercourse tributaries are crossed by the proposed works their contribution to downstream waterbodies is assessed collectively. Therefore, the zone of cumulative effects extends from watercourse crossing points lower end of any waterbody.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);

The Class 1 and Class 2 watercourses where in-stream works are required (5 No.) are mostly small headwater streams;

The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);

The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented in consultation with IFI.

- The brief to temporary duration and reversibility of any effects.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

**Impact Magnitude:**

At Mountphilips Substation, instream works will be required at 1 no. watercourses with fisheries value (associated with the installation of permanent crossing structures). Changes to the flow regime will be long-term and permanent; alteration to flow morphology will be subject to Project Design Measures including the reinstatement of watercourses at crossing locations.

Of the 63 No. watercourse crossings along the UWF Grid Connection 110kV UGC, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to *potential* culvert replacement works. The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure.

At the 5 no. potential culvert replacement works locations, changes to the flow regime will be brief to temporary and for the duration of the immediate works, restricted to the location of the works area within the footprint of, or directly adjacent to the existing crossing point in the public road. Following the completion of construction works, changes to the flow regime will be long-term and permanent; alteration to flow morphology will be subject to Project Design Measures including the reinstatement of watercourses at crossing locations.

Significance of the Effect: Not Significant

**Rationale for Impact Evaluation:**

- In-stream works or culvert replacement works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are mostly small headwater streams;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented following consultation with IFI.
- The brief to temporary duration and reversibility of any effects.

**UWF Replacement Forestry**

Impact Magnitude: None

Significance of the Effect: Not Significant

**Rationale for Impact Evaluation:**

- No requirement for instream works on fisheries value watercourses
- 10m set back from 1 no. stream crossing
- Planting will be carried out by hand.

**Upperchurch Windfarm**

**Impact Magnitude:**

Construction works will take place in close proximity to 1 No. watercourses with fisheries value. No instream works are required at this location and this watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works.



Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No instream works are required on the watercourse crossing within the Upperchurch Windfarm site</li> <li>• Implementation of the Sediment &amp; Erosion Control Plan</li> </ul>
<b>UWF Other Activities</b>
Impact Magnitude: None
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No potential for disturbance effects due to the small scale of activities and no sediment creating activities</li> </ul>
<b>Evaluation of In-Combination Impact – Changes to Flow Regime</b>
<b>Effect Of Whole UWF Project In-Combination with Other (unrelated) Projects</b>
<p><u>Cumulative Impact Magnitude:</u></p> <p>A potential decrease in aquatic habitat (via changes to flow regime) is identified at <b>10 No.</b> watercourse crossings where instream works or culvert replacement works are required within watercourses evaluated as having fisheries value – 5 no. for UWF Grid Connection and 5 no. for UWF Related Works. The spatial extent of such effects will occur within the footprint of the instream works, dispersed between two regional catchments and within several local sub-catchments.</p>
<b>Significance of the Effect: Not Significant</b>
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <p>Instream works potentially affecting the flow regime are required at a limited number of locations; the majority of which require temporary works and a smaller sub-set require permanent instream structures.</p> <p>Implementation of Project Design Measures at all watercourse crossing and instream works locations to minimize effects</p> <p>Implementation of the sensitive crossing designs to be implemented. Provision of reinstatement works including: site-specific bank stabilization measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.</p>

**4.6.3 Lower River Suir SAC: Decrease in habitat quality via: surface water runoff, sediment entrainment or release; release of fuels oils/ chemicals, surface/ ground water quality impacts**

**Qualifying Interests:** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260], Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage: Construction stage

Impact Source: Movement of soil, machinery; earthworks, excavations, overburden storage; sediment; instream works; new crossing structures; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brush storage; culvert replacement works.

Impact Pathway: water runoff flowpaths, watercourses, land cover, air

Impact Description: Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community.

Instream works at some watercourses will require direct excavation of the banks and bed of the watercourse, which can change the physical character of the watercourse and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic species. Although erosion and deposition are natural process in watercourses<sup>4</sup>, varying naturally throughout the year, additional sediment contributions entering the watercourse, such as from construction works adjacent to or upstream of individual watercourses, can have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels and mortality impacts for salmonid eggs (affecting recruitment) and invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

**Evaluation of the Subject Development Impact – Decrease in instream aquatic habitat quality**

**UWF Related Works Impact**

Impact Magnitude: There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works and in-stream works will be required at 25 no. of these locations. 26 no. of the total 32 no. crossings are located within the Clodiagh River catchment, 5 no. in the Owenbeg catchment and 1 no. in the Bilboa catchment. Of these 32 no. crossings, 5 No. watercourse crossings (all in the Clodiagh River catchment) were evaluated as having fisheries value.

The spatial extent of such effects will occur within the footprint of the instream works, and also downstream within the zone of sediment transport.

The effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character due to instream works has been evaluated as a Slight to Moderate adverse impact on availability, diversity and quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (taking account of instream works).

**Significance of the Effect: Not Significant**

<sup>4</sup> EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems,

**Rationale for Impact Evaluation:**

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required (5 No.) are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works);
- The spatial extent of effects to the watercourse channel is limited to the footprint of the instream works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and
- Impacts to the watercourse channel are temporary and reversible with reinstatement.
- The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude:

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River catchments, and where UWF Related Works will include 5 No. watercourse crossings evaluated as having fisheries value and UWF Grid Connection may potentially require culvert replacement works on 1 no. Class 1 watercourses. Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to instream aquatic habitat quality will be negligible.

The spatial extent of such effects will occur within the footprint of the instream works or culvert replacement works, and also downstream within the zone of sediment transport. Where minor watercourse tributaries are crossed by the proposed works their contribution to downstream waterbodies is assessed collectively. Therefore, the zone of cumulative effects extends from the watercourse crossing points to the lower end of any waterbody

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- In-stream works or culvert replacement works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required (5 No. for UWF Related Works in the Clodiagh River) and culvert replacement works (1 no. for UWF Grid Connection in the Clodiagh River catchment and None in the Bilboa River catchment) are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM’s as provided in Appendix A9 of the EIA Report for UWF Related Works);
- The spatial extent of effects to the watercourse channel is limited to the footprint of the instream works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and
- Impacts to the watercourse channel are temporary and reversible with reinstatement.
- The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

General Impact Magnitude: Of the 63 No. watercourse crossings along the Grid Connection, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to *potential* culvert replacement works instream. The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure. The effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character due to instream works at potential culvert replacement locations has been evaluated as a Slight to Moderate adverse impact on availability, diversity and quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (Moderate impact taking account of instream works).

Specifically, in relation to the Newport River (see cumulative impacts with other Projects below): Approximately 4.3km of the 110kV UGC exists within the Newport River catchment (and Small River catchment) including the Mountphilips Substation site. Effects on surface water are likely to arise mainly from trench excavation at the terminal end of the route, as well as at watercourse crossings within the existing road corridor. There are 4 No. watercourse crossings (including haulage routes) within the Newport (and Small River) River catchment (W1-W4).

Specifically, in relation to the Clare River (see cumulative impacts with other Projects below): Approximately 11km of the 110kV UGC exists within the Clare River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings at existing road bridge and culvert locations. There are 30 no. watercourse crossings (including haulage routes) within the Clare River catchment (W5-W34).

Specifically, in relation to the Bilboa River (see cumulative impacts with other Projects below): Approximately 11.7km of the 110kV UGC exists within the Bilboa River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings at existing road bridge and culvert locations. There are 24 No. watercourse crossings within the Bilboa River catchment (W35-W58).

Specifically, in relation to the Clodiagh River (see cumulative impacts with other Projects below): Approximately 1.5km of the 110kV UGC exists within an upper headwater tributary of the Clodiagh River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings of one minor watercourse and small drains at existing road bridge and culvert locations. There are 5 No. watercourse crossings within the Clodiagh River catchment (W59-63).

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM's as provided in Appendix A7 of the EIA Report for UWF Grid Connection). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM's as provided in Appendix A7 of the EIA Report for UWF Grid Connection);
- The spatial extent of effects to the watercourse channel will occur within the footprint of any works at potential culvert replacement locations;
- The frequency of such an event is once of for any culvert replacement works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

Newport River catchment

- The watercourse crossings within the Newport River catchment requiring culvert replacement works (3 No.) are streams and therefore works will only be completed between the IFI permitted season of May and

September (Project Design Measure), no instream works are required for the crossing of the Newport River (W4);

- It's likely only between 100 – 200m of the trench will be excavated in any day with only 1– 2 watercourse crossings being completed in any one day (assumed 1 - 2 work crews);
- All effects will be brief to temporary in nature and reversible.

Clare River catchment:

- The majority of the watercourse crossings (24 of 30 No.) within the catchment have low / no fisheries value (Class 3 and Class 4 watercourses) and therefore the potential for downstream water quality effects is limited due to small size and low or absent flows;
- Watercourse crossings at potential culvert replacement locations which may require instream works at Class 1 watercourses (W9 and W33) will only be completed between the IFI permitted season of July to September (Project Design Measure), no instream works are required at the crossing of the Clare (Annagh) River (W31), as works will be within the existing bridge structure;
- It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings being completed in any one day (assumed 1 -2 work crews); and,
- The short-term, temporary nature of the works within the catchment;
- All effects will be brief to temporary in nature and reversible.

Bilboa River catchment:

- The majority of the watercourse crossings (21 of 24 No.) within the catchment have low / no fisheries value (Class 3 and Class 4 watercourses) and therefore the potential for downstream water quality effects is limited due to small size and low or absent flows;
- There are no instream works or culvert replacement works required at watercourse crossings at Class 1 watercourses (W40, W44 and W48), all works will be within the existing bridge structures;
- It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings (no crossing works) being completed in any one day (assumed 1 -2 work crews); and,
- The short-term, temporary nature of the works within the catchment;
- All effects will be brief to temporary in nature and reversible.

Clodiagh River catchment:

- All watercourse crossings (5 No.) are within a single headwater tributary of the upper Clodiagh sub-catchment. The majority of these crossings (4 of 5 No.) have no fisheries value (Class 4 watercourses). Only 1 No. crossing of a Class 2 first order stream is required; therefore, the potential for downstream water quality effects is limited due to small size and low or absent flows;
- Watercourse crossings comprising potential culvert replacement works instream at the Class 2 watercourse (W60) will only be completed between the IFI permitted season of July to September (Project Design Measure);
- It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings (4 out of 5 with no culvert replacement works) being completed in any one day (assumed 1 -2 work crews); and,
- The short-term, temporary nature of the works within the catchment;
- All effects will be brief to temporary in nature and reversible.

**UWF Replacement Forestry – N/A, evaluated as excluded, see Section 8.4.2.2.1.**

Impact Magnitude: None

There is no potential for acidification effects during the growth stage, as the UWF Replacement Forestry will be deciduous in nature. There is no risk of pollution events as herbicide or fertilizers will not be used and the use of machinery will be minimal. There is no risk of aquatic habitat degradation (as a result of nitrogen deposition) as commercial tree felling will not be required – UWF Replacement Forestry will be a permanent native woodland.

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- No requirement for instream works on fisheries value watercourses
- 10m set back from 1 no. stream crossing
- Planting by hand
- No herbicide or fertilizers

No tree felling
<b>Upperchurch Windfarm</b>
<u>Impact Magnitude:</u> There is 1 no. watercourse crossing within the Upperchurch Windfarm Site, evaluated as having fisheries value (Class 1, WW2). This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Baseline conditions indicated that the aquatic species were present year-round, and impacts were evaluated as being of high magnitude for aquatic species. However, it was identified that significant impacts were not probable/likely post-mitigation. The 2013 EIS concludes that water quality effects will not be significant
Significance of the Effect: Not Significant
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> <li>• A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required;</li> <li>• All effects were evaluated as reversible and temporary in the short-term and impacts were associated with construction phase works.</li> </ul>
<b>UWF Other Activities</b>
Impact Magnitude: None
Significance of the Effect: Not Significant
<u>Rationale for Impact Evaluation:</u> No instream works or sediment creating activities adjacent to watercourses
<b>Cumulative Information: Individual Evaluations of Other Projects or Activities</b> <i>(Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is no potential for cumulative effects with the UWF Related Works)</i>
<b>Other Project: Consented Bunkimalta Windfarm</b>
<u>Impact Magnitude:</u> Clare River catchment: 5 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Clare River catchment. Newport River catchment: 11 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Newport River catchment
<u>Significance of the Impact:</u> Not Significant
<u>Rationale for Impact Evaluation:</u> As per Bunkimalta WF EIS (2013) <ul style="list-style-type: none"> <li>• Construction activities will be at least a minimum of 50m where possible;</li> <li>• A Sediment Control Plan will be put in place during the construction phase to control runoff.</li> </ul>
<b>Evaluation of Other Cumulative Impacts – Decrease in instream aquatic habitat quality</b>
<b>Whole UWF Project Effect</b>
<u>Cumulative Impact Magnitude:</u> For the Whole UWF Project, a potential decrease in aquatic habitat quality is identified at a total of <b>10 No.</b> watercourse crossings where instream works are required within watercourses evaluated as having fisheries value – 5 no. for UWF Grid Connection, and 5 no. for UWF Related Works. The spatial extent of such effects will occur within the footprint of the instream works, dispersed between two regional catchments and within several local sub-catchments. Impact range is located downstream of the lowest point in the waterbody where Whole UWF Project works are required, with reference to the zone of sediment transport.
<b>Significance of the Effect: Not Significant</b>

Rationale for Cumulative Impact Evaluation:

- The watercourse crossing works required for the UWF Grid Connection (110kV UGC) (63 No. total) are largely located within the River Shannon catchment (58 No.) while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are largely located in the River Suir surface water catchment;
- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species within the affected catchments downstream.
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,
- The frequency and duration is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary; however, downstream siltation effects are short-term and not reversible.

**All Elements of the Whole UWF Project with Other Projects or Activities**

Cumulative Impact Magnitude:

In relation to cumulative effects within the Clare River catchment; Approximately 11km of the 110kV UGC exists within the Clare River catchment and 5 No. of the 16 No. consented Bunkimalta Windfarm turbines are located within the Clare River catchment.

In relation to cumulative effects within the Newport River catchment; Approximately 4.3km of the 110kV UGC exists within the Newport River catchment including the Mountphilips Substation site, along with 11 No. of the 16 No. consented Bunkimalta Windfarm turbines.

**Significance of the Effect: Not Significant**

Rationale for Cumulative Impact Evaluation:

Clare River:

- The relatively small number of the Bunkimalta Windfarm turbines within the Clare River catchment;
- The relatively large surface water catchment area of the Clare River – 71km<sup>2</sup>;
- The short-term temporary nature of the 110kV UGC works within the Clare River catchment, limited to 2 No. crossings of watercourses with fisheries value (Class 1 / Class 2).

Newport River

- The relatively small scale of the 110kV UGC works within the Newport River catchment (4.3km of temporary access roads);
- The large surface water catchment area of the Newport River catchment – 126km<sup>2</sup>;
- The relatively large upstream distance of the Bunkimalta Windfarm site (~10km) from the 110kV works;
- The temporary and short-term nature of the proposed 110kV UGC works within the Newport River catchment, limited to 2 No. crossings of watercourses with fisheries value (Class 1 / Class 2);
- Sediment Control Plans will be in place at the Bunkimalta Windfarm

**4.6.4 Lower River Suir SAC: Disturbance to Fisheries**

**Qualifying Interests:** Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage: Construction stage

Impact Source: Instream works; Operating machinery; Excavation works; Noise and human disturbance; Reinstatement

Cumulative Impact Source: Operating machinery; Excavation works; Noise and human disturbance; Reinstatement

Impact Pathway: Surface water; Direct contact; Ground and air vibrations

Impact Description: Instream works and machinery operation within or in close proximity to any watercourse has the potential to directly disturb or displace salmonid fish and aquatic species within fish-bearing streams, or sensitive aquatic receptors such as white-clawed crayfish. Fish are likely to mobilise outside of their territories due to human disturbance, but will return once the disturbance effect diminishes. Aquatic invertebrates are less sensitive to disturbance and displacement arising from human activity and are scoped out from evaluation of disturbance/displacement effects. The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations – i.e. Class 1 or Class 2 watercourses. Disturbance or displacement effects will be brief to temporary in nature, lasting for the duration of works at or in close proximity to Class 1 or Class 2 watercourses.

**Evaluation of the Subject Development Impact – Disturbance or Displacement**

**UWF Related Works Impact**

Impact Magnitude:  
 Of the 32 No. watercourse crossings within the UWF Related Works construction works area boundary, 6 No. have been evaluated to have fisheries value. Of these 6 No. watercourses, 5 No. will be subject to instream works (the remaining 1 no. crossing WW2 will use a clear span structure with no requirement for instream works). Any fish present are likely to be affected for between 1 – 2 days during instream works. The frequency of these disturbance effects is once for half of the locations (cables trenches with or without new permanent culverts) and twice for the remaining locations (temporary culverts (once for installation and once for removal)).

**Significance of the Effect: Not Significant**

- Rationale for Impact Evaluation:
- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
  - The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
  - The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
  - There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
  - The singular frequency of any disturbance events at half of the locations, and;



- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude:

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River and to a lesser extent, Bilboa River catchments. UWF Related Works will require works in close proximity to 6 no. watercourses with fisheries value, and instream works at 5 no. of these watercourses in headwater streams of the Bilboa and upper Clodiagh (Tipperary). Upperchurch Windfarm will require works in close proximity to 1 no. watercourse in the Clodiagh River catchment (construction of a clear span bridge (no instream works) at this location). UWF Grid Connection (110kV UGC) will require works in close proximity to 4 no. watercourses within the Bilboa River catchment and in close proximity to 1 no. watercourse crossing (with potential for culvert replacement works at this crossing) in the Clodiagh River catchment.

UWF Replacement Forestry will involve works in proximity to a Class 1 watercourse in the Clodiagh River catchment, with planting carried out by hand at the site, it is therefore evaluated that any cumulative impacts will be negligible.

The spatial extent of cumulative disturbance or displacement effects is localised at each crossing location–

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
- The singular frequency of any disturbance events at half of the locations, and;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

Impact Magnitude:

At Mountphilips Substation, works will take place in close proximity to 2 no. watercourses with fisheries value, of these 2 no. will be subject to instream works.

Along the 110kV UGC, there are 63. No. watercourse crossings, of which 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. may be subject to culvert replacement works. The remaining crossings identified as having fisheries value (8 No.), including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure. Proposed works including trench excavation, bridge

works, culvert replacement, and resurfacing may give rise to disturbance to fish and aquatic biodiversity receptors present within Class 1 and Class 2 watercourses over a period of 1 – 2 days at each crossing location. The frequency of these disturbance effects is once for cables trenches with or without new permanent culverts. The remaining crossings are over existing crossing structures which do not require any works and cables will be installed either under or over the structure, disturbance effects at these locations are therefore evaluated as Imperceptible.

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM’s as provided Appendix A7 of the EIA Report for UWF Grid Connection);
- The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any potential culvert replacement works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations.
- The frequency of disturbance effects will be once for all cables trenches where instream works are required, installed at crossing locations with or without new permanent culverts
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

**UWF Replacement Forestry**

Impact Magnitude: None

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- No requirement for instream works on fisheries value watercourses
- 10m set back from 1 no. stream crossing
- No potential for disturbance effects due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses.

**Upperchurch Windfarm**

Impact Magnitude: None:

**1 No.** watercourse with fisheries value occurs within the footprint of the Upperchurch Windfarm site. This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Disturbance effects are limited to the construction works for the new bridge along with the subsequent use of the new bridge throughout the construction period.

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species; however, it was identified that significant impacts were not probable/likely post-mitigation. A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required; disturbance will be limited to the immediate works area.

**UWF Other Activities**

Impact Magnitude: None

Significance of the Effect: Not Significant

Rationale for Impact Evaluation:

- No instream works or sediment creating activities adjacent to watercourses
- No potential for disturbance effects due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses.
- The Upperchurch Hen harrier Scheme will include planting of 1.4km of woody scrub species along riparian corridors and fencing of watercourse corridors to prevent access to the watercourses by livestock, which will enhance the quality of riparian habitats.

**Evaluation of Other Cumulative Impacts – Disturbance or Displacement**

**Whole UWF Project Effect**

Cumulative Impact Magnitude:

Direct disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement works and directly upstream and downstream of all crossings, temporary and permanent instream works structures and bank-side works. The watercourse crossings are dispersed between two regional catchments and within several local sub-catchments. In total there are **8 No.** instream works locations where crossings of fish-bearing streams are required, all of which will be sensitive to disturbance. However, at the local level in the context of individual receptors, temporary displacement will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Additional disturbance effects within the watercourse channel will be limited to the spatial extent of trenching and ducting activities.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
- The frequency of disturbance effects will be once for all cables trenches at crossing locations with or without potential culvert replacement; and
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.



**4.6.5 Lower River Suir SAC: Spread of Aquatic Invasive Species**

**Qualifying Interests:** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260], Atlantic Salmon [1106], Sea Lamprey [1095], Brook Lamprey [1096], River Lamprey [1099], Otter [1355]

Project Life Cycle Stage: Construction stage

Impact Source: Instream works; Excavation works

Cumulative Impact Source: Instream works; culvert replacement works, Excavation works

Impact Pathway: Surface water; Movement of soils and machinery

Impact Description: Invasive aquatic species include non-native, invasive flora and also fish and invertebrate fauna. Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses during the course of instream works or transported via excavation material by site machinery. Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or affecting significant habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream and downstream within a watercourse, potentially extending throughout the catchment.

**Evaluation of the Subject Development Impact – Spread of Aquatic Invasive Species**

**UWF Related Works Impact**

Impact Magnitude:

There is the potential for introduction of non-native, invasive aquatic species at all **32 No.** watercourse crossings associated with the UWF Related Works.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species is evaluated as non-reversible.

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at all **32 No.** watercourse crossings in the Clodiagh and Bilboa river catchments associated with the UWF Related Works, the affected watercourses may be further exposed to cumulative risk of spread or introduction from Upperchurch Windfarm construction traffic and works in proximity to some of the watercourse crossings, and works in proximity to an additional 29 no. watercourse crossing locations associated with UWF Grid Connection with the Clodiagh and Bilboa river catchments.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.

<ul style="list-style-type: none"> <li>● In this respect, the spread of aquatic invasive species is evaluated as non-reversible.</li> </ul>
<p><b>Cumulative Information: Individual Evaluations of Other Projects</b></p>
<p><b>UWF Grid Connection</b></p>
<p><u>Impact Magnitude:</u> There is the potential for introduction of non-native, invasive aquatic species at all <b>63 No.</b> watercourse crossings associated with the Mountphilips Substation and 110kV UGC works.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>● The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.</li> <li>● In this respect, spread of aquatic invasive species is evaluated as non-reversible.</li> </ul>
<p><b>UWF Replacement Forestry</b></p>
<p>Impact Magnitude: None</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u> There is no potential for the planting works to spread invasive species, as there are no instream works required.</p>
<p><b>Upperchurch Windfarm</b></p>
<p><u>Impact Magnitude:</u> There is the potential for introduction of non-native, invasive aquatic species at the <b>1 No.</b> watercourse crossing associated with the Upperchurch Windfarm works.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>● The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species, in the absence of mitigation. However, it was identified that significant impacts were not probable/likely.</li> <li>● Baseline conditions indicated that the aquatic species were present year-round and impacts were associated with construction phase works.</li> <li>● All effects were evaluated as reversible and temporary in the short-term; however, in the case of potential spread of aquatic invasive species, there is the potential for long-term, irreversible impacts</li> </ul>
<p><b>UWF Other Activities</b></p>
<p>Impact Magnitude: None</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>● No instream works</li> </ul>

<ul style="list-style-type: none"> <li>o activities within the riparian corridor of Class 1 or Class 2 watercourses.</li> </ul>
<p><b>Evaluation of Other Cumulative Impacts – Spread of Aquatic Invasive Species</b></p>
<p><b>Whole UWF Project Effect</b></p>
<p><u>Cumulative Impact Magnitude:</u>                  There is the potential for introduction of non-native, invasive aquatic species at the <b>96 No.</b> watercourse crossing associated with the Whole UWF Project (1 no. occur on both the UWF Related Works and the Upperchurch Windfarm and 1 no. occurs on both the UWF Related Works and the UWF Grid Connection).</p>
<p><b>Significance of the Effect: Not Significant</b></p>
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.</li> <li>• In this respect, the spread of aquatic invasive species are evaluated as non-reversible</li> </ul>

**4.6.6 Lower River Suir SAC: Disturbance to Otter**

**Qualifying Interests: Otter [1355]**

Project Life Cycle Stage: Construction stage

Impact Source: Construction Noise and Visual Intrusion

Cumulative Impact Source: Noise and Visual Intrusion

Impact Pathway: Air and visibility

Impact Description: Otter are rated as a very high sensitivity receptor (based on International importance ratings) and do not tolerate disturbance at or near holts (breeding dens) that are in active use (breeding may occur at any time of the year, but most likely during the period). As no active holts were located within 150m (upstream or downstream) of works locations (i.e. watercourse crossings) then effects are reduced to disturbance/displacement of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors. This could include the disturbance of animals at resting places (couches).

These effects are reduced by an adherence to completing works during daylight hours only as part of Project Design. However watercourses are present which form part of or are hydrologically connected to European Sites (cSAC's) which include Otter as a Qualifying Interest. Significant effects on Otter from displacement resulting from noise or visual intrusion may therefore affect in turn the integrity of these designated site(s).

**Evaluation of the Subject Development Impact – Otter: Disturbance/Displacement**

**UWF Related Works Impact**

Impact Magnitude: 32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings. Due to 75% of these watercourses being drains or marginal watercourses, and the absence of otter holts within 150m of the crossing points, impact magnitude is expected to be Negligible

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

- No active holts were identified overlapping the construction area boundaries or within 150m, and;
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration.
- Application of project design measures for the protection of Otter,

**UWF Related Works In-Combination Impact**

Cumulative Impact Magnitude: The potential for cumulative effects relates to the in-combination effects of UWF Related Works and Upperchurch Windfarm and to a lesser extent of UWF Related Works with Upperchurch Windfarm and UWF Grid Connection. However, as the majority of watercourses crossings associated with these Projects within the Cumulative Evaluation Study Area are drains or of marginal ecological value, and the absence of otter holts within 150m of works areas, the cumulative impact magnitude is expected to be Negligible.

Cumulative effects with UWF Replacement Forestry will be negligible due to the separation distance between UWF Related Works and UWF Replacement Forestry, and the absence of otter on UWF Replacement Forestry site. There is no potential for Other Projects to cause cumulative effects to Otter with UWF Related Works.



<p><b>Significance of the Effect: Not Significant</b></p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No active holts within 150m of watercourse crossing locations;</li> <li>• Works will take place during daylight hours only, and;</li> <li>• Be of brief-temporary duration.</li> <li>• Application of project design measures for the protection of Otter.</li> </ul>
<p><b>Cumulative Information: Individual Evaluations of Other Projects</b></p>
<p><b>UWF Grid Connection</b></p>
<p><u>Impact Magnitude:</u> There were four records of Otter within the UWF Grid Connection study area, consisting of paths, slides, tracks and spraints. Two of the four records, which were from the Toorenbrien Lower River, and consisted of a spraint found approximately 50m downstream of the watercourse crossing, and a print found on a ledge underneath the bridge arch. The remaining records are from the Bilboa River and the Annagh River, consisting of a single slide at each location. No active breeding or resting sites (Holts or Couches) were identified, however. No Otters were observed, although this is typical in respect of a species where most activity takes place at night.</p> <p>Out of the 63 identified watercourse crossings along the UWF Grid Connection route, 15 watercourses were identified from photographs taken during a preliminary survey of all watercourse crossing locations, as having potential to support Otter and were therefore surveyed 150m upstream and downstream of the crossing for the presence of Otter. Out of these 15 watercourses surveyed, evidence of Otter was found at three watercourse crossings. No active breeding or resting sites (Holts or Couches) were identified, however.</p> <p>Considering the brief duration of works at watercourse crossings and the small scale of the proposed works the magnitude of impact in relation to disturbance of Otter is expected to be slight.</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• The implementation of Additional Mitigation Measure AMM-01:Disturbance to or displacement of Otter – see UWF Grid Connection EIA Report</li> <li>• The very high sensitivity <u>rating</u> of the species, and;</li> <li>• Recorded Otter evidence in close proximity to the identified crossings, notwithstanding;</li> <li>• Works will take place during daylight hours, and;</li> <li>• The brief-temporary duration of disturbance events, with</li> <li>• Project design measures to avoid/reduce effects also in place , however;</li> <li>• Effects may not be reversible.</li> </ul>
<p><b>UWF Replacement Forestry</b></p>
<p><u>Impact Magnitude:</u> Negligible</p>
<p>Significance of the Effect: Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• No active holts or resting places were recorded in baseline studies, and;</li> <li>• All planting will be done by hand, and;</li> <li>• Undertaken during daylight hours, and</li> <li>• Of temporary duration;</li> <li>• No significant contrast to baseline conditions is expected.</li> <li>• Any effect will be reversible, given the low magnitude of source disturbance.</li> </ul>

<b>Upperchurch Windfarm</b>
<u>Impact Magnitude:</u> None
Significance of the Effect: Not Significant
<u>Rationale for Impact Evaluation:</u> No Otter were recorded and hence disturbance effects were not scoped in for evaluation.
<b>UWF Other Activities</b>
<u>Impact Magnitude:</u> Negligible
Significance of the Effect: Not Significant
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> <li>• No otter holts or resting places were recorded at Haul Route Activity locations, and;</li> <li>• Locations of Overhead Line Activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours;</li> <li>• The offsetting effects of long term management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing Otter habitat – including the enhancement of riparian corridors.</li> <li>• The low reversibility of the above described management.</li> </ul>
<b>Evaluation of Other Cumulative Impacts – Otter: Disturbance/Displacement</b>
<b>Whole UWF Project Effect</b>
<u>Cumulative Impact Magnitude:</u> Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur across a c.30km wide area within the River Shannon and River Suir catchments. There is potential to cause disturbance or displacement of otter at larger watercourse crossing points. These larger watercourses occur along the UWF Grid Connection, whereas the watercourses on the UWF Related Works and Upperchurch Windfarm sites are mainly drains and larger drains/watercourses with marginal habitat value to otter.  In relation to in-combination effects of the whole project, there is no potential for cumulative additive effects to Otters from both the UWF Related Works and the Upperchurch Windfarm due to the absence of Otter recorded at the watercourses within these sites. There is no potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the Neutral effect of UWF Replacement Forestry. The in combination effect of the whole project, where considered in its entirety is in the order of Project Element 1 i.e. the Grid Connection. In total 3 no. watercrossing points along the public road had signs of Otter use within 300m, the nearest of these crossing points is separated from UWF Related Works and Upperchurch Windfarm by ca.6km, therefore there is no likelihood of additive cumulative effects to individual Otters from both the UWF Grid Connection works and UWF Related Works or Upperchurch Windfarm works.
<b>Significance of the Effect: Not Significant</b>
<u>Rationale for Cumulative Impact Evaluation:</u> <ul style="list-style-type: none"> <li>• Notwithstanding the separation distances between the 3 no. watercourse crossing locations along the UWF Grid Connection and the watercourse crossing locations associated with the UWF Related Works and Other Elements, and</li> <li>• The absence of Otter records at the UWF Related Works, UWF Replacement Forestry and UWF study areas, and</li> </ul>

- Works will take place during daylight hours, and;
- Be brief-temporary in duration;
- Recorded evidence of Otter in close proximity, and
- Potential (albeit unlikely) for sequential effects



**4.7 Evaluation of Impacts on Slieve Felim to Silvermines Mountain SPA**

The Screening stage evaluated the potential for UWF Related Works to cause effects to the Slieve Felim to Silvermines Mountain SPA via identified impact pathways (Sections 2.8 to 2.9). Potential for effects were identified with regard to individual Qualifying Interests designated within the SAC. These effects are evaluated further within the NIS, to determine whether the UWF Related Works project (either alone or in-combination) will affect the conservation status of these conservation interests, and thus the overall integrity of any European Site.

The evaluation of the UWF Related Works takes account of the following information in making a determination as to the character, magnitude and significance of effects:

The description of the UWF Related Works project, and its Project Design Measures, Best Practice Measures, Emergency Response Procedures, and Management Plans in respect of Waste, Surface Water and Invasive Species described in Section 3.2,

the descriptions of the other projects associated with the Whole UWF Project (including their Project Design Measures, Best Practice Measures, Emergency Response Procedures and Management Plans), provided in Section 3.3.1 to Section 3.3.4; and

the descriptions of the unrelated projects and any associated management plans, provided in Section 3.3.5.

**The Special Conservation Interest and Potential Effects which were screened in for evaluation are listed in Table 17.**

**Table 17: Special Conservation Interest Screened In due to potential for UWF Related Works to cause effects**

European Site: Lower River Suir SAC (002137)	
Slieve Felim to Silvermines Mountain SPA	Hen Harrier ( <i>Circus cyaneus</i> )
Potential Effects to Qualifying Interests	Indirect habitat effects Indirect or ex-situ disturbance or displacement effects

**Indirect habitat reduction or loss effects** are examined in the following order:

1. Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat (Section 3.7.1)

**Indirect or ex-situ disturbance or displacement effects** are examined in the following order:

1. Disturbance/Displacement of foraging Hen Harrier (ex-situ during the breeding season) (Section 3.7.2)

**4.7.1 Slievefelim to Silvermines Mountain SPA: Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat**

**Qualifying Interests: Hen Harrier**

Project Life Cycle Stage: Construction/Operational stage

Impact Source: Permanent structures such as the telecom relay pole, forestry felling to facilitate access roads (permanent or temporary), the re-alignment of previously consented roads in addition to temporary sources such as short-term trenching for underground cabling, the temporary removal of hedgerows, temporary widening of entrances, and temporary access roads for the transport of materials.

Cumulative Impact Source: provision of windfarm access roads , turbine hardstanding areas and substation compounds for consented windfarm; Land cover change from Agricultural Practices such as drainage, Direct habitat loss through peat extraction of intact bog, and habitat loss through forest maturation.

Impact Pathway: Land cover

Impact Description: Hen Harrier is a very high sensitivity receptor of International Importance. Permanent Land take or land use/cover change of optimal foraging habitats (i.e. suitable and within the established core range for connectivity to a nest) during the construction stage may cause secondary effects for this Annex I species and SPA special conservation interest, however the magnitude of effects is distance (to nearest nest) dependant. Land cover change may result in foraging habitat (if available) being temporarily unavailable to any birds which may be dependant on this during key periods of the breeding cycle such as provisioning young. Effects may affect breeding success/productivity for one whole cycle, or until vegetation is re-instated. Loss of high dependency foraging habitat in close proximity to nesting locations at key periods of the breeding cycle may result in reduced productivity and/or nest success, in particular where it occurs within 2km of a nest location, and limited alternative habitat is available.

**No nests occur within 2km of UWF Related Works and foraging usage in the vicinity is evaluated as low** and in line with the trends established in the 2013 EIS for the consented Upperchurch Windfarm (see section on passage of time – Section 8.6.1.2.11 ). **Available foraging habitat within 50m of UWF Related Works, is sub optimal because of the distance to nearest active nest, the managed nature (intensive agricultural/grazing) of much of the surrounding landscape, and the fragmented nature of available foraging patches.**

The spatial extent of permanent habitat loss associated with UWF Related Works will be limited to the footprint of forestry felling, and the re-alignment of windfarm road RWR1. No permanent loss of suitable habitat is associated with Haul Route Works or the proposed Telecom Relay Pole or other ancillary activities. Temporary land use change will occur during various stages of UWF Related Works such as short-term trenching for underground cabling, and temporary access roads for the transport of materials where these locations overlap suitable foraging habitat.

In relation to cumulative effects, no permanent loss of suitable foraging habitat is associated with the UWF Grid Connection 110kV UGC; nor UWF Replacement Forestry, while the Upperchurch Hen Harrier Scheme (UWF Other Activities) and UWF Replacement Forestry will result in increased availability of foraging habitat once operational.

**Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive.**

**Evaluation of the Subject Development Impact– Reduction in or Loss of Suitable Foraging Habitat**

<p><b>UWF Related Works Impact</b></p> <p><u>Impact Magnitude:</u> Total permanent land take of suitable foraging habitat is confined to improved agricultural grassland (0.12Ha); Wet Grassland (0.07Ha), upland blanket bog/Conifer mosaic (0.01Ha), Mature or closed canopy conifer plantation (0.28Ha) and scrub (0.004Ha) and totals 0.48Ha.</p> <p>In addition, during construction, suitable foraging habitat will be temporarily unavailable, this habitat includes up to 4.6km of internal cabling located in agricultural lands and 2.1km located in forestry lands, in addition to c.1500m of temporary access roads at 4 no. differing locations. All these lands will be available for foraging within one growing season once vegetation has re-established.</p> <p>Permanent habitat loss represents 0.28% of the suitable foraging habitat within 50m of the UWF Related Works and is considered negligible.</p> <p><b>Note:</b> Within the UWF Related Works site, HW7 is the only location where the <u>site</u> boundary overlaps the Hen Harrier SPA. No construction works and no land use change will take place within the SPA boundary, in line with the precautionary principle, to avoid effects on habitats possibly suitable for Hen Harrier. All other UWF Related Works locations and lands are located outside the SPA.</p>
<p><b>Significance of the Effect: Not Significant</b></p>
<p><u>Rationale for Impact Evaluation:</u></p> <p>The very high sensitivity rating of the species (context), and;</p> <p>The extent of permanent habitat loss, evaluated as a very slight change from baseline condition, and;</p> <p>The long-term duration of permanent habitat loss, however;</p> <p>The reversibility of temporary habitat loss is expected within the temporary-short term period, also;</p> <p>The nearest active hen harrier nest is &gt;4km to the west or south, and it is considered that hen harrier nesting at this distance will not rely on the foraging habitat at UWF Related Works thus significantly reducing likelihood of effect;</p> <p>Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;</p> <p>The reversibility of the impact with the reinstatement of lands at temporary works locations.</p>
<p><b>UWF Related Works In-Combination Impact</b></p> <p><u>Cumulative Impact Magnitude:</u> The potential for cumulative impacts on foraging habitat relates to Upperchurch Windfarm, UWF Replacement Forestry and UWF Other Activities. There is no potential for cumulative impacts with UWF Grid Connection because the route of 110kV UGC is entirely on paved roads (with no foraging habitat) within the UWF Related Works Cumulative Evaluation Study Area.</p> <p>The magnitude of cumulative impacts relates to a total of 0.48ha of suitable foraging habitat permanently lost within 50m of UWF Related Works, additional ca. 98.11ha permanent loss at Upperchurch Windfarm, and ca. 4ha short term loss at UWF Replacement Forestry.</p> <p>Once growth at UWF Replacement Forestry (4ha) and Upperchurch Hen Harrier Scheme (UWF Other Activities) establishes (128ha), the gain of permanent suitable foraging habitat will be ca. 132ha. The UWF Replacement Forestry (1.5km east) and Upperchurch Hen Harrier Scheme habitats (adjacent to and within 2km of the SPA) - will have a positive effect to foraging hen harriers of High magnitude.</p>

Significance of the Effect: Not Significant
<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> <li>• The very high sensitivity rating of the species (context), and;</li> <li>• The extent of permanent habitat loss, evaluated as a very slight change from baseline condition, and;</li> <li>• The long-term duration of permanent habitat loss, however;</li> <li>• This is limited to loss only associated with the UWF Related Works;</li> <li>• The reversibility of temporary habitat loss is expected within the temporary-short term period, also;</li> <li>• The nearest active hen harrier nest is &gt;4km, and it is considered that hen harrier nesting at this distance will not rely on the foraging habitat at UWF Related Works thus significantly reducing likelihood of effect;</li> <li>• Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;</li> <li>• The reversibility of the impact with the reinstatement of works areas, and;</li> <li>• the planting and management of lands for the use of Hen Harrier (UWF Other Activities and UWF Replacement Forestry) considered positive in quality and of High magnitude;</li> </ul>
<b>Cumulative Information: Individual Evaluations of Other Projects</b>
<b>UWF Grid Connection</b>
<p><u>Impact Magnitude:</u> No foraging habitat for Hen harrier will be lost on a temporary or permanent basis.</p>
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u> The very high sensitivity rating of the species (context), and; The magnitude of effect, on the sensitive aspect Hen Harrier, following Percival <i>et al.</i> is evaluated as 'Negligible' (0-1% of habitat lost), equivalent to a non-distinguishable change away from baseline conditions;</p>
<b>UWF Replacement Forestry</b>
<p><u>Impact Magnitude:</u> Available foraging habitat for Hen Harrier currently within the land folio boundary comprises improved agricultural grassland (3.54Ha); Wet Grassland (0.44Ha) and Scrub (0.01Ha); in total 3.99Ha. This entire area will undergo landuse change to UWF Replacement Forestry (deciduous forestry) to be managed specifically for the use of Hen Harrier, including the incorporation of 'tried and tested' management measures which facilitate Hen Harrier foraging and usage.</p>
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> <li>• The demonstrated sensitivity of Hen Harriers to positive management (context), and;</li> <li>• The extent of lands to be managed for Hen Harrier, and;</li> <li>• The permanent duration, and;</li> <li>• The Non-reversibility with lands to remain post decommissioning.</li> </ul>
<b>Upperchurch Windfarm</b>
<p><u>Impact Magnitude:</u> As per the 2013 RFI the magnitude of foraging habitat loss was calculated as 95Ha (actual loss plus effective loss through displacement effects). For completeness, given that the estimate of total displacement was based on 2017 as the construction year, an upwardly revised total estimate of 98.11Ha has been extrapolated from data provided in the RFI (Table 7 of the UWF Ecological Management Plan). This figure corresponds with 2019 as the construction year – however it is still less than the 128Ha of lands</p>



to be provided as additional favourable foraging areas under the conditioned Upperchurch Hen Harrier Scheme (evaluated other 'UWF Other Activities').

Significance of the Effect: Not Significant

**Rationale for Impact Evaluation:**

- The effective loss of 98.11Ha of habitat constitutes an effect of medium magnitude (5-20% of available habitat lost);
- The implementation of the Upperchurch Hen Harrier Scheme, as conditioned;
- Very High sensitivity of the species, and;
- Long term duration.

**UWF Other Activities**

Impact Magnitude: Haul Route Activities will not result in loss of foraging habitat. Monitoring Activities will not result in a loss of Hen Harrier foraging habitat. Overhead Line Activities will not result in loss of foraging habitat.

The consented Upperchurch Hen Harrier Scheme will result in 2.2Ha of trees, 1.4km of riparian habitat and 2.8km of new hedgerow being enhanced or created during initial activities. In total 128ha of habitat will be managed to increase the area of hen harrier foraging habitat, measures set down to achieve this include:

- Rush management to control coverage and increase suitability for foraging habitat, promoting prey item species;
  - 2,085m increase in hedgerow, resulting in increased edge habitat for foraging and prey items;
  - 3ha enclosures of native scrub and trees, increased cover for prey item species;
  - Lines of electric fence with plastic fliers so that they are more visible to the hen harrier, to avoid mortality;
- Enhancement of the riparian corridor (to maintain corridor value for foraging Hen Harrier):
1. 1220m of woody scrub species
  2. Erect fencing to make stockproof and exclude access to river by livestock.

The following restrictions will apply to landowners within the Upperchurch hen harrier habitat scheme (to maintain habitat suitability):

- Limited spreading of fertiliser (every 4-5 years).
- Limited spreading of lime (every 4-5 years).
- No burning.
- No excavation of drains or reclaiming heath or bog.
- 
- In addition to the management described, workshops are proposed with landowners to advise landowners on the importance and implementation of the above measures.

In total 128Ha of agricultural lands will be managed for the benefit of Hen Harrier, outside the turbine 250m buffer and the footprint of the development; as per the Upperchurch Windfarm EMP. The net gain to Hen Harrier is 128Ha-98.11Ha which is 30Ha. The magnitude of this gain (an increase of 30% on the effective lands loss plus management of 128Ha to maintain suitability for Hen Harrier foraging) is evaluated as High as it constitutes a major alteration to the baseline features present.

Significance of the Effect: Not Significant

**Rationale for Impact Evaluation:**

- The demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The extent of lands to be managed for Hen Harrier, and;
- The long term duration, and;
- Low reversibility.

<b>Other Project: Consented Milestone Windfarm</b>
<u>Impact Magnitude:</u> Effective Habitat Loss of Hen Harrier habitat within 250m of each turbine location, where harriers use suitable forestry and or/other habitats. However, an area of lands at Knockcurraghbola Commons will be managed as part of a Hen Harrier Management Area for the lifetime of the windfarm for the benefit of Hen Harrier- comprising 10.8ha. This includes rush management, nutrient management, weed control, and the maintenance of edge habitat.
Significance of the Effect: Not Significant
<u>Rationale for Impact Evaluation:</u> The impact is evaluated as neutral given the effective habitat loss is mitigated by lands proposed to be managed for the benefit of Hen Harrier, over the lifetime of the wind farm.
<b>Other Project: Consented Castlewaller Windfarm</b>
<u>Impact Magnitude:</u> Effective Habitat Loss of Hen Harrier habitat within 250m of each turbine location, where harriers use second rotation aged 3-9 years-estimated at 47.9Ha. <sup>5</sup> However, it was also proposed to manage 47.9Ha of clear felled woodland for the lifetime of the windfarm for the benefit of Hen Harrier.
Significance of the Effect: Not Significant
<u>Rationale for Impact Evaluation:</u> The impact is evaluated as neutral given the effective habitat loss is exactly equivalent to the area of clear felled woodland to be managed for the benefit of Hen Harrier, over the lifetime of the wind farm.
<b>Other Project: Consented Bunkimalta Windfarm</b>
<u>Impact Magnitude:</u> The Bunkimalta Windfarm SHMP acknowledges that Hen Harriers may show avoidance around 250m of each turbine. A total area of 162.76 hectares must be replaced by mitigation measures. DAHG cites this figure also. As the residual effects presented in the Bunkimalta Windfarm EIS were subject to substantive discussion subsequent to decision, we do not cite these; rather we cite the relevant text from the inspectors Report. The comments below refer to the loss of foraging habitat within the context of Conservation Objectives for the (Hen Harrier) SPA, as cited in the Inspectors Report for Bunkimalta Wind Farm: Pg. 34 <i>"In summary therefore, I conclude that the relevant matter is that there is a total mitigatory habitat of 164.3 hectares which compares favourably with the 162.76 hectares lost. Subject to the Board being satisfied that the management of the 137.3 hectares of perpetual open canopy forest under the SHMP will provide suitable Hen Harrier habitat then the Board can be satisfied that the development would be in accordance with the conservation objective for the SPA."</i> and; Pg.41 <i>"Based on the available information, which includes best scientific evidence and which is adequate for the purposes of Appropriate Assessment; I consider that the development would not result in net loss of Hen Harrier habitat. Therefore, I conclude that the Board can be satisfied that the development would not significantly affect the integrity of the SPA having regard to its Conservation Objective"</i>
Significance of the Effect: Not Significant
<u>Rationale for Impact Evaluation:</u>

<sup>5</sup> Castlewaller Woodland Partnership (2007). Response to RFI from North Tipperary County Council prepared by Fehily Timoney and Company

Based on an evaluation of “no net loss”
<b>Activity: Forestry/Agriculture</b>
<p><b>Impact Magnitude:</b> Hen Harrier in Ireland makes extensive use of both first and second rotation pre-thicket forest habitat during the breeding period. However, by its successional nature forests inevitably matures and become less suitable (Avery &amp; Leslie, 1990; Madders, 2000; 2003; O’Donoghue, 2004).</p> <p>The following is cited directly from the document titled “Hen Harrier Conservation and the Forestry Sector in Ireland”, published by NPWS in 2015:  “Forests less than 15 years old constitute to varying degrees a potential foraging resource for Hen Harriers. In line with the forecasted reduction in the extent of the forest nesting resource, indicative future estimates of the extent of the potential national <i>forest foraging</i> resource within the SPA network shows an acute declining trend over the next 10 years<sup>6</sup>”(emphasis added). This negative trend is also applicable to the Slieve Felim to Silvermines Mountains SPA.</p> <p>It is likely that some sites within the ‘wider countryside’ areas supporting breeding Hen Harrier that have been afforested will also experience forestry related changes both due to the maturation of existing forest habitat and the conversion of currently useful habitat (e.g. scrub, low intensity managed farmland) to a less stable state. In relation to Agriculture, in the absence of available information on trends it is evaluated as Neutral.</p>
Significance of the Impact: <b>Significant (negative)</b>
<p><u>Rationale for Impact Evaluation:</u> precautionary basis</p>
<b>Activity: Turf-cutting</b>
<p><b>Impact Magnitude:</b> Habitats possibly subject to Peat Extraction such as Upland Blanket Bog (335Ha or 1.61% of the SPA) and Cutover Bog (507Ha or 2.42% of the SPA) occur within the SPA and ergo where the SPA overlaps the CE 2km study area for Related Works. Peat extraction by hand or through mechanical means is ranked as a medium level pressure in respect of Hen Harrier within the SPA<sup>7</sup>.</p> <p>Some of these habitats where they overlap the SPA are further protected through the provision of NHA’s wherein further turf cutting of intact areas is unlawful, or SAC’s wherein Conservation Objectives to protect Qualifying Interest bog are set out. Within the Whole Project Cumulative Evaluation Study Area, turf extraction appears to form part of the current baseline environment at various locations such as Bleanbeg Bog, Cummermore, Gortmahonoge and at Cummer (Mulloghney). Some of these habitats where they overlap the SPA are further protected through the provision of NHA’s such as at Bleanbeg Bog, wherein further turf cutting of intact areas is unlawful, or SAC’s wherein Conservation Objectives to protect Qualifying Interest bog are set out. Outside the SPA but within 2km of the UWF Related Works, some turf cutting may take place at Dooree Commons.</p>
Significance of the Effect: Not Significant
<p><u>Rationale for Impact Evaluation:</u> Restrictions on further turf cutting in intact areas/protected areas, and; The limited extent of lands subject to turbarry (rights to cut turf) within the Hen Harrier SPA overall (4%), with little of this occurring within the CE Study Area; The reversibility of any effect, (in the context of Hen Harrier) with birds expected to continue to utilize re-vegetating cutover bog <i>for foraging</i>.</p>

<sup>6</sup> NPWS.2015. Hen Harrier Conservation and the Forestry Sector in Ireland.

<sup>7</sup> <https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004165.pdf>

**Evaluation of Other Cumulative Impacts – Reduction in or Loss of Suitable Foraging Habitat**

**Whole UWF Project Effect**

Cumulative Impact Magnitude:  
 Both positive and negative quality effects occur with regard to Hen Harrier foraging Habitat loss across the Whole UWF Project. The negative effects of Upperchurch Windfarm, which is evaluated herein within the context of effective displacement based on a revised construction date of 2019 (as per the Upperchurch Windfarm RFI 2013); is effectively mitigated by the activities consented under the Upperchurch Hen Harrier Scheme (UWF Other Activities), which as intended results in a net gain through design to Hen Harrier both in area and quality of habitat. No negative effects stem from the UWF Grid Connection; and effects overall are limited to permanent negative quality effects from the Related Works themselves of negligible magnitude (0.48ha).  
  
 The provision and management of UWF Replacement Forestry specifically for Hen Harrier, outside but adjacent to the SPA also contributes to a net gain overall to Hen Harrier of an additional 30Ha of actively managed foraging habitat.

**Significance of the Effect: Not Significant**

Rationale for Cumulative Impact Evaluation:  
 The demonstrated sensitivity of Hen Harriers to positive management (context), and;  
 The extent of lands to be managed for Hen Harrier overall, and;  
 The long term to permanent duration, given that UWF Replacement Forestry will not be decommissioned, and;  
 The absence of any likely significant effects from the UWF Grid Connection 110kV route, also;  
 The construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;  
 The reversibility of negative effects with reinstatement of lands, and the application of the Upperchurch Hen Harrier Scheme and other measures as described.

**All Elements of the Whole UWF Project with Other Projects or Activities**

Cumulative Impact Magnitude:  
 The magnitude of foraging habitat loss resulting from the Whole UWF Project, Castlewaller Wind Farm, Bunkimalta Windfarm, Milestone Windfarm, Agriculture/ Forestry and Turbary. Effects from other activities or projects in the vicinity are evaluated as largely neutral however forestry is generally a negative trend in the background environment currently and evaluated as significant in that regard. Effects from Hen Harrier management plans in respect of Castlewaller, Bunkimalta and Milestone Windfarms are neutral. The magnitude of effect is in the order of any net gain from the Whole UWF Project which is at minimum 30Ha, this is offset by any negative trend in the environment with respect to forestry declines in the short-medium term (next 10 years & expected to increase subsequently).

**Significance of the Effect: Not Significant**

Rationale for Cumulative Impact Evaluation:  
 The net gain in terms of lands managed specifically for the use of Hen Harrier, and;  
 Extent of lands to be managed in total, notwithstanding,  
 The medium-term duration of a negative trend in respect of reductions in forestry based foraging habitat

**4.7.2 Slievefelim to Silvermines Mountain SPA: Disturbance/Displacement of foraging Hen Harrier (ex-situ during the breeding season)**

**Impact Description**

Project Life Cycle Stage: Construction/Operational stage

Impact Source: Noise and Visual Intrusion from anthropogenic activities during construction and/or operation

Cumulative Impact Source: Multiple source of noise and visual intrusion occurring within the same spatial or temporal timeframe

Impact Pathway: Air

Impact Description: Hen Harriers are known to be sensitive to disturbance at nests (Masden 2010, Pearce-Higgins et al., 2012). Disturbance to foraging birds ex-situ from the immediate vicinity of nests and/or designated sites may impair foraging success during critical periods of the breeding season such as when provisioning young, or result in increased energy expenditure and subsequent reductions in fitness. This may be dependent on whether or not sequential effects occur, levels of habituation to background disturbance or whether sufficient displacement habitat is available once a bird experiences a disturbance event. The degree or frequency of baseline foraging is an influencing factor, as is distance to nests as this is a likely determinant of dependency. A minimum approach distance (MAD) as a function of flight initiation distance is used to determine the likelihood of any effect on an individual.

There have been no specific studies examining the flight initiation distance (FID) of non-breeding Hen Harriers to human disturbance. However, a study on FIDs on Northern Harrier *Circus cyaneus* from aircraft suggested a mean FID of 70m (Booms *et al.*, 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey et al. (2016) indicated a mean FIDs for Falconiformes of 89.7m (MAD 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorised vehicles). Collectively, these data would suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away and within this distance only events of similar magnitude to the sources described (e.g. at 90dB) may have any effect. However birds will be habituated to certain background activities and react less to artificial noise versus the presence of humans.

Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;

During the hen harrier roosting season (October to February inclusive), construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset.

Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season i.e. not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming.

In relation to cumulative effects, the Upperchurch Hen Harrier Scheme (UWF Other Activities) activities are similar to background farming. If UWF Grid Connection works are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory hen harrier breeding surveys will be completed, before such works initiate, such that all pre-breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all

construction activities, until construction is complete and for 3 years thereafter. No UWF Grid Connection works will be carried out within 2km of an active hen harrier nest.

**Evaluation of the Subject Development Impact– Reduction in or Loss of Suitable Foraging Habitat**

**UWF Related Works Impact**

Impact Magnitude: Disturbance and visual intrusion during the excavation and subsequent cabling and reinstatement of 17.9km of trenching, disturbance and visual intrusion during the realignment of windfarm roads, and during haul route works, the use of flag men and any other activities associated with the construction stage – primarily where the activity occurs adjacent to suitable habitat but it is assumed that birds may transit through non-optimal habitat on a precautionary basis.

The use of machinery and equipment will include 1 no. 12ton excavator, 1 no. 6 ton excavator, 2 no. dump trucks, 1 no. vibrating roller, 1 no. cable pulling winch, a pole planter and auger drill, 1 no. diesel generator and various other small tools and equipment. Works will include the importation of construction materials such as aggregate via local and regional road networks. A traffic management plan will be in place.

Main construction activities will last for 6-8 months and will take place at the same time as the construction of the consented Upperchurch Windfarm and UWF Grid Connection. Works will be phased to varying degrees such as for water quality protection requirements.

During the construction stage, heavy machinery and vehicles which will be used at works areas during the construction stage will emit noise during their operation, noise will also be emitted from certain construction activities such as excavation or rock breaking or by mobile generators which may be used at work areas. Noise emissions will not be at levels to cause significant adverse effects on humans. Construction works, including excavations and the use of heavy machinery will cause low levels of ground vibration. No blasting or piling will occur at the UWF Related Works construction works areas. Vibration emissions will not be at levels to cause significant adverse effects (on humans).

Magnitude of effect is evaluated as negligible based on likely noise levels.

**Significance of the Effect: Not Significant**

Rationale for Impact Evaluation:

Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;  
 The distance to the nearest confirmed nest locations (4.8km, 4.5km respectively), and;  
 Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km- no nests are within 4km;  
 Absence of dependency on the habitats within 50m of the UWF Related Works for foraging, with;  
 Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;  
 Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;  
 The duration of effects, (momentary-brief) and;  
 High reversibility once the bird moves beyond 150m.

**UWF Related Works In-Combination Impact**

**Cumulative Impact Magnitude:**

The potential for cumulative impacts via disturbance relates to Upperchurch Windfarm, UWF Related Works and works on Upperchurch Grid Connection within the UWF Related works Cumulative Evaluation Study Area. There is no potential for cumulative impacts with UWF Replacement forestry (planted by hand) and the UWF Other Activities Upperchurch Hen Harrier Scheme (similar to farming activities and outside temporal overlap).

The magnitude of cumulative impacts relates to the potential for concurrent activity encountered sequentially by foraging birds as they move through the area, which is reduced by the carrying out of construction works for UWF Related Works outside of the breeding season. Magnitude of effect is evaluated as negligible based on predicted noise levels.

Significance of the Effect: Not Significant

**Rationale for Impact Evaluation:**

- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;
- The distance to the nearest confirmed nest locations (4.8km ,4.5km respectively for UWF Related Works and 3.15km for the closest point of the UWF Grid Connection within the UWF Related Works Cumulative Evaluation Study area of 2km), and;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4kmno nests are within 4km;
- Absence of dependency on the habitats within the UWF Related Works Cumulative Evaluation Study Area for foraging, with;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.

**Cumulative Information: Individual Evaluations of Other Projects**

**UWF Grid Connection**

**Impact Magnitude:**

UWF Grid Connection works will take place primarily within the public roads where habitats within 50m are generally unsuitable. Off-road works at Mountphilips are not proximal to any nesting and therefore regularly foraging birds during the breeding season. Within the study period (2016-2017) three no. breeding attempts were confirmed within 2km of the 110kV UGC route; the closest confirmed nest was 600m from the R503 at Kilnacappagh, the other 2 nests were located in consecutive years at Baurnadomeeny at ca. 1.8km and 1.9km respectively from the R503 therefore foraging birds from these 3 no. nests may encounter sources of disturbance within or ex-situ to the SPA. Likely noise levels from construction are evaluated as negligible in the context of existing background trends.

Significance of the Effect: Not Significant

**Rationale for Impact Evaluation:**

- Birds will already be habituated to road-based noise and visual intrusion;
- Works will take place outside the breeding season (March-August) for works locations within 2km of an identified nest.
- Effects will be momentary-Brief in duration, and;
- unlikely to affect any individual >150m from source, and;
- Highly reversible once any individual moves beyond 150m.

**UWF Replacement Forestry**

<p><b>Impact Magnitude:</b></p> <p>All planting will be done by hand. Magnitude is negligible.</p>
<p><b>Significance of the Impact:</b> Slight (neutral)</p>
<p><b>Rationale for Impact Evaluation:</b></p> <ul style="list-style-type: none"> <li>• No contrast in activities from background levels, and;</li> <li>• Momentary – brief duration, with;</li> <li>• High reversibility once any individual moves beyond 150m.</li> </ul>
<p><b>Upperchurch Windfarm</b></p>
<p><b>Impact Magnitude:</b> The nearest known historical nest location to the consented windfarm is that within the townland of Knockalough, located ca. 2.4 km to the south– no confirmed nest has occurred here in recent years (i.e. 2015-2018) however and the last confirmed nesting attempt was in 2014. Previously a nest has been located at Curreeny, ca. 2.7km to the northwest of the consented Windfarm. A slight percentage of foraging activity from 2 no. nests may overlap sources of noise. Temporary Disturbance has already been evaluated as not significant (2013 NIS)</p>
<p><b>Significance of the Effect:</b> Not Significant</p>
<p><b>Rationale for Impact Evaluation:</b></p> <ul style="list-style-type: none"> <li>• The randomness and low number of hen harrier observations during the 2010 and 2011 vantage point surveys for the 2013 EIS suggests that the consented Upperchurch Windfarm is used infrequently by hen harriers.</li> </ul>
<p><b>UWF Other Activities</b></p>
<p><b>Impact Magnitude:</b> Negligible. The Upperchurch Hen Harrier Scheme will involve activities with similar sources of noise/intrusion as farming practices; Haul Route Activities trimming will be similar to existing noise/intrusion from regular maintenance of roadside hedgerows, and works on the Killonan Line will compare with existing maintenance in terms of the scale and magnitude of any noise/intrusion.</p>
<p><b>Significance of the Effect:</b> Not Significant</p>
<p><b>Rationale for Impact Evaluation:</b></p> <ul style="list-style-type: none"> <li>• No contrast from background levels of noise of intrusion is expected, and;</li> <li>• Birds will already be habituated to road-based noise and visual intrusion;</li> <li>• Effect duration will be brief to momentary for most activities, and;</li> <li>• Highly reversible once any individual moves beyond 150m</li> </ul>
<p><b>Cumulative Information: Individual Evaluations of Other Projects or Activities</b></p>
<p><b>Other Project: Milestone Windfarm</b></p>
<p><b>Impact Magnitude:</b> Milestone windfarm has already been constructed. Magnitude of effects is limited to operational disturbance only. It is assumed that Hen Harrier management measures to mitigate for disturbance will be in place at the time of construction of the Whole UWF Project.</p>
<p><b>Significance of the Effect:</b> Not Significant</p>
<p><b>Rationale for Impact Evaluation:</b></p> <p>The development of a HHMP to mitigate for any disturbance effects such as displacement from foraging areas;</p>
<p><b>Other Project: Consented Castlewaller Windfarm</b></p>



<p><b>Impact Magnitude:</b> Noise and visual intrusion during the construction period may interact with foraging individuals from 2-3 no. nests within 2km. Magnitude of Effects on Hen Harrier have already been evaluated as Negligible.</p>
<p>Significance of the Effect: Not Significant</p>
<p><b>Rationale for Impact Evaluation:</b></p> <ul style="list-style-type: none"> <li>• Primarily on the design of the windfarm allowing for the maintenance of foraging corridors and separation distance to nearest nests, and;</li> <li>• The extent of displacement habitat available for any disturbed birds.</li> </ul>
<p><b>Other Project: Bunkimalta Windfarm</b></p>
<p><b>Impact Magnitude:</b> Noise and visual intrusion during the construction period may interact with foraging individuals from 1 no. nests within 2km.</p>
<p>Significance of the Effect: Not Significant</p>
<p><b>Rationale for Impact Evaluation:</b></p> <p><i>“During construction, the various activities may discourage birds from foraging in the immediate vicinity of the works. Whilst this is an adverse impact, it is temporary in duration. Further, the issue can be mitigated by avoiding works (partially or totally) during the main hen harrier nesting season.”</i></p>
<p><b>Activity: Forestry/Agriculture</b></p>
<p><b>Impact Magnitude:</b>                  Evaluated as negligible, effectively same as background. Disturbance from forestry operations is part of background trends, limited information is available on magnitude of this however forestry extraction is subject to Forest Service procedure for felling within the Hen Harrier breeding season, this includes full Appropriate Assessment to protect Hen Harriers within SPA’s. It is assumed this process will be undertaken for all commercial forestry resulting in no likelihood of significant effects or adverse effects on site integrity.</p>
<p>Significance of the Effect: Not Significant</p>
<p><b>Rationale for Impact Evaluation:</b></p> <ul style="list-style-type: none"> <li>• No contrast in activities from background levels, and;</li> <li>• Brief-Temporary duration, with;</li> <li>• High reversibility once any individual moves beyond 150m.</li> <li>• Forestry activities are subject to Appropriate Assessment of their effects on Hen Harrier.</li> </ul>
<p><b>Activity: Turf-cutting</b></p>
<p><b>Impact Magnitude:</b> Evaluated as negligible, effectively same as background.</p>
<p>Significance of the Effect: Not Significant</p>
<p><b>Rationale for Impact Evaluation:</b></p> <ul style="list-style-type: none"> <li>• No contrast in activities from background levels, and;</li> <li>• Momentary – brief duration, with;</li> <li>• High reversibility once any individual moves beyond 150m.</li> </ul>
<p><b>Evaluation of Other Cumulative Impacts – Reduction in or Loss of Suitable Foraging Habitat</b></p>
<p><b>Whole UWF Project Effect</b></p>
<p><b>Cumulative Impact Magnitude:</b>                  Magnitude of the cumulative effects will be in the order of the Related Works, consented wind farm and Grid Connection where they overlap, i.e. the same as Related Works. This is evaluated as negligible.</p>

**Significance of the Effect: Not Significant**

Rationale for Cumulative Impact Evaluation:

- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive, avoiding any potential for sequential effects;
- The distance to the nearest confirmed nest locations (4.8km ,4.5km respectively for UWF Related Works and 3.15km for the closest point of the UWF Grid Connection within the UWF Related Works Cumulative Evaluation Study area of 2km), and;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km
- No nests are within 4km of UWF Related Works;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.

**All Elements of the Whole UWF Project with Other Projects or Activities**

Cumulative Impact Magnitude:

The magnitude of foraging disturbance ex-situ from nests/designated sites resulting from the Whole UWF Project, Castlewaller Wind Farm, Bunkimalta Windfarm, Milestone Windfarm, Agriculture/ Forestry and Turbary. Effects from other activities or projects in the vicinity are evaluated as neutral – apart from Castlewaller Windfarm which is evaluated as Negligible and Bunkimalta (evaluated as Not Significant). Magnitude of effects from the Whole UWF Project is negligible and solely in the order of the UWF Related Works, UWF Grid Connection and Consented Upperchurch Windfarm where they overlap.

**Significance of the Effect: Not Significant**

Rationale for Cumulative Impact Evaluation:

- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive, avoiding any potential for sequential effects;
- Construction works for the Grid Connection will not take place during the period March-August at any locations within 2km of a confirmed Hen Harrier nest, and;
- The distance to the nearest confirmed nest locations in respect of the UWF Related Works, UWF Grid Connection and consented Upperchurch Windfarm, where they overlap;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the individual bird moves beyond 150m.
- The separation distance from the zone of overlap between UWF Related Works, UWF Grid Connection, and Consented Upperchurch Windfarm from Castlewaller Windfarm (>10km) or Bunkimalta Windfarm (>8km) precludes foraging overlap and ergo sequential effects.

## 4.8 Findings of Stage 2 Evaluations of Effects on Integrity of European Sites

A detailed evaluation of the impacts of UWF Related Works project (either alone or in-combination with other projects) on the 3 no. European Sites, listed below has been completed:

1. Lower River Shannon SAC (002165)
2. Lower River Suir SAC (002137)
3. Slievefelim to Silvermines SPA (004077)

Following the evaluation it is concluded that **UWF Related Works, alone or in combination, will not cause adverse impacts on the integrity of the Lower River Shannon SAC (002165), Lower River Suir SAC (002137) or Slievefelim to Silvermines SPA (004077)**, with respect to their conservation objectives and to their structure and function.

## 4.9 Efficacy of the Environmental Protection Measures

The efficacy of the environmental protection measures is described below.

### 4.9.1 Efficacy of the Project Design Measures, Best Practice Measures and Management Plans

The Project Design Measures, Best Practice Measures and Management Plans (including Emergency Response Measures), listed in Section 5.3.1 to Section 5.3.4 inclusive, have been developed using best practice and will adhere to the following Standard Guidelines and Best Practice documentation: We refer the appended Construction Phase Surface Water Management Plans (Tab 4 of the EMP included as Appendix A9, and plans included as Appendix A11 in respect of Upperchurch Windfarm for detail on relevant legislation, guidance and literature from which drainage and water quality measures have been derived. These include as follows:

- Water Framework Directive (2000/60/EC);
- Local Government (Water Pollution) Act, 1977–1990;
- Water Quality (Dangerous Substances) Regulations, 2000;
- Arterial Drainage Act, 1945;
- S.I. No. 41 of 1999 Protection of Groundwater Regulations, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);
- S.I. No. 249 of 1989 Quality of Surface Water Intended for Abstraction (Drinking Water), resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);
- S.I. No. 439 of 2000 Quality of Water intended for Human Consumption Regulations and S.I. No. 122 of 2014 European Communities (Drinking Water) Regulations;
- S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations; and,
- S.I. No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010;
- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters;
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes; and,
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board;
- PPG01 General guide to the prevention of water pollution;
- PPG02 Above ground oil storage tanks;
- PPG05 Works in near or liable to affect watercourses;
- PPG06 Working at construction and demolition sites;
- PPG07 Refuelling Facilities;
- PPG11 Preventing pollution at industrial sites;
- PPG18 Control of spillages and fire fighting run-off;
- PPG20 Dewatering underground ducts and chambers;
- PPG21 Pollution Incident Response Planning;
- PPG23 Maintenance of Structures over Water; and,
- PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers.
- CIRIA Report C502 Environmental Good Practice on Site;
- CIRIA Report C532 Control of Water Pollution from Construction Sites;
- CIRIA Report C648 Control of Pollution from Linear Construction Project; Technical Guidance;
- CIRIA Handbook C650 Environmental good practice on site;
- CIRIA Handbook C651 Environmental good practice on site checklist;
- CIRIA Report C609 – SuDS – hydraulic, structural & water quality advice; and,

- CIRIA Report C697 – The SuDS Manual;
- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
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- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford.
- EMP for UWF Grid Connection, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage
- The Planning System and Flood Risk Management Guidelines (DoEHLG, 2009).
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- Scottish Natural Heritage (2014) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities <http://www.snh.gov.uk/docs/C278917.pdf>.
- Ruddock and Whitfield (2007) A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage. <http://www.snh.org.uk/pdfs/strategy/renewables/BIRDSD.pdf>
- National Roads Authority (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority, Dublin.
- EMP for UWF Grid Connection - Invasive Species Management Plan.
- Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000;
- BS 3998 (1989) Recommendations for tree work
- NRA (2006). Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes. National Roads Authority, Dublin.
- Section 46(a) of the Wildlife (Amendment) Act 2000
- Tree Preservation Orders (TPO), which are made under Section 205 of the Planning and Development Act, 2000
- Scottish Natural Heritage (2012). Protected Species Advice for Developers – Pine Marten. <http://www.snh.gov.uk/docs/A1959323.pdf>.
- Scottish Natural Heritage (2012). Protected Species Advice for Developers – Red Squirrel. <http://www.snh.gov.uk/docs/A1959329.pdf>.
- <http://www.fisheriesireland.ie/Research/invasive-species.html>
- <http://www.nonnativespecies.org/checkcleandry/>
- Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP)
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII,2011)
- Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)

The Project Design Measures, Best Practice Measures, Management Plans and Emergency Response Measures are included in full in the appended UWF Related Works Environmental Management Plan (Appendix A9) and the Management Plans for Upperchurch Windfarm (Construction Environmental Management Plan, Ecological Management Plan and Early Operational Phase Environmental Management

Plan) included in Appendix A11. The planning conditions for the consented Upperchurch Windfarm will also be included in the relevant Upperchurch Windfarm Environmental Management Plans.

#### **4.9.2 Compliance Monitoring of the Implementation of Environmental Protection Measures**

The implementation of the environmental protection measures (Project Design Environmental Protection Measures, the Best Practice Measures, and the Waste, Traffic, Invasive Species and Surface Water Quality Management Plans) will be managed through dedicated environmental management plans for the UWF Related Works and the consented Upperchurch Windfarm and will be part of the management for UWF Grid Connection.

The implementation of these protection measures will be the responsibility of the Project Manager and a contractual obligation on the Contractor/Construction Site Manager during the construction stage. The Project Promoter will have overall responsibility that the Whole UWF Project Elements are developed as planned.

Monitoring and auditing of the compliance of the construction of UWF Related Works and Upperchurch Windfarm, and UWF Grid Connection, with their respective Environmental Management Plans will be carried out by an independent (of the Construction Contractor), full time, and competent Environmental Clerk of Works, and by the Upperchurch Windfarm Site Manager during the early operational stage. The Environmental Clerk of Works will also prepare weekly EMP Compliance Reports.

The Project Promoter will be responsible for the costs of monitoring and will provide sufficient resources to the Environmental Clerk of Works to monitor, audit and report on the compliance of construction works with the EMP. Sufficient resources will also be provided to the Environmental Clerk of works to engage a team of Environmental Managers to assist with monitoring and auditing, and for specialist environmental and engineering consultants as required.

#### 4.9.3 Compliance Monitoring in relation to the Lower River Shannon SAC and Lower River Suir SAC

In line with the guidance documents prescribed above, during any dewatering operations carried out at watercourse crossings, it is possible that juvenile Atlantic salmon and lamprey species, as well as White-clawed crayfish may be present after the watercourse has being dammed. To avoid any direct impacts, a qualified and experienced aquatic ecologist will be present during the initial dewatering works to manage and confirm the removal of these species, under license, to alternative suitable habitat, well away from the working area. This will avoid indirect effects on contiguous populations of these Annex II species within the Lower River Shannon SAC or Lower River Suir SAC downstream. As prescribed in the Best Practice Measures, flows within affected watercourses will maintain downstream connectivity at all times to avoid a dewatering event in the watercourse channel.

The measures required above for watercourse crossings will ensure that water quality impacts from instream sediment, or site runoff mobilised during construction are adequately mitigated. There will be no direct discharge of pumped water into any watercourse.

All watercourse crossings occur within or upstream of salmonid watercourses. In order to demonstrate compliance with and effectiveness of the prescribed mitigation, it is proposed to carry out construction phase monitoring of water quality upstream and downstream of the crossing locations. Both suspended solids (TSS) and turbidity will be monitored upstream and downstream of at each watercourse crossing during works. Suspended solids analysis will be carried out in an approved laboratory and data cannot be obtained in real-time. Turbidity probes provide real-time data on site and can be used to indicate a comparison of the suspended silt fraction in the water column upstream and downstream. Both TSS and turbidity sampling will be completed in-situ both upstream and downstream of all watercourse crossings (other than drains) immediately before works commence and then during and after to manage compliance with water quality standards. It is recognised that TSS and turbidity fluctuate naturally within the aquatic environment based on seasonal and sporadic flow events. The measures proposed below are based on standard guidance; however, ongoing monitoring during the works will provide proactive adjustments in line with prevailing conditions.

Surface water quality standards for TSS are not specified in the Surface Water Regulations (2009); however, limit levels or trigger values will be defined for both TSS and turbidity based on the pre-construction monitoring results; which will also be compared to maximum guideline values for sensitive receptors as follows:

- With reference to the minor headwater streams within the Clodiagh and Multeen Freshwater pearl mussel catchments, it is proposed that no elevated silt load is discharged to these watercourses downstream of the works areas.

We also refer BPM's in respect of the protection of Water Quality during Construction – see Appendix A9.

**4.9.4 Efficacy of Hen Harrier Protection measures**

All protection measures have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification.

**4.9.5 Compliance Monitoring in relation to the Slievefelim to Silvermines Mountains SPA**

Best practice in respect of the monitoring of nesting and roosting Hen Harrier ensures that surveys (both breeding and roosting) will be completed prior to the start-up of all construction activities, until construction is complete and for 4 years thereafter (Years 1-3 and Year 5) (Project Design Measure).

Surveys will also be undertaken in years coinciding with any National Surveys of Hen Harrier to fully inform future trends in respect of the Slievefelim to Silvermines Mountains SPA. A report including nesting activity, levels of usage and any disturbance events, will be provided to the Competent Authority and NPWS following the completion of each survey season.

The Project Ecologist will keep NPWS informed of the real-time status of nesting Hen Harrier as a result of the monitoring associated with this project.



**4.9.6 Summary Statement on the Efficacy of the Environmental Protection Measures**

The above environmental protection measures have been developed and will be implemented in the light of best scientific knowledge and best practice or 'tried and tested' methods, therefore no reasonable scientific doubt remains as to the absence of any adverse effects on the integrity of the European Sites under consideration.

The implementation of the above environmental protection measures (Project Design Measures, Best Practice Measures, Management Plans) will be a contractual obligation on the Appointed Contractors, and the compliance with these measures will be audited by a team of competent, independent Environmental Managers who will have a full-time presence at works areas during the construction period.

#### **4.10 Addressing Mitigation Failure**

The Project Design Measures and Best Practice Measures prepared specifically for this project have been designed to incorporate regulatory guidance and are based on robust and proven measures for the avoidance of significant adverse effects.

In addition, the proposed Management Plans include a supervisory structure which ensures accountability for all works elements, with requirements for suitably qualified specialists (Proponent oversight; Proponent's representatives including Ecological Clerk of Works/Site Ecologist; Contractor's specialist input; competent experts as supervision in order to manage sensitive works elements and deliver the planned outcomes within the parameters of the impact assessment, as specified.

On this basis, it can be confidently concluded that failures in the mitigation measures and their prescribed outcomes will be avoided.

## **4.11 Conclusion**

In summary it can be concluded that in light of the conservation objectives and rationale for designation of the European Sites under consideration; the potential for significant effects exists as a result of UWF Related Works. These potentially significant effects have been evaluated, and with the implementation of measures as described, it is concluded that neither the UWF Related Works, nor any other Element of the Whole UWF Project, alone or in combination, will result in any effects that will adversely affect the integrity of the European Sites under consideration, having regard to their respective conservation objectives, in circumstances where “no reasonable scientific doubt” remains as to the absence of such adverse effects.

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# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A1: European Site Synopsis**



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## SITE SYNOPSIS

**SITE NAME: SLIEVEFELIM TO SILVERMINES MOUNTAINS SPA**

**SITE CODE: 004165**

The Slievefelim to Silvermines Mountains SPA is an extensive upland site located in Counties Tipperary and Limerick. Much of the site is over 200 m in altitude and rises to 694 m at Keeper Hill. Other peaks included in the site are Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site is underlain mainly by sandstones of Silurian age. Several important rivers rise within the site, including the Mulkear, Bilboa and Clare.

The site consists of a variety of upland habitats, though approximately half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*). Roughly one-quarter of the site is unplanted blanket bog and heath, with both wet and dry heath present. The bog and heath vegetation includes such typical species as Ling Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Bell Heather (*Erica cinerea*), Common Cottongrass (*Eriophorum angustifolium*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Deergrass (*Scirpus cespitosus*) and Purple Moor-grass (*Molinia caerulea*). The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment. Some stands of deciduous woodland also occur, especially within the river valleys.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Hen Harrier.

The site is one of the strongholds for Hen Harrier in the country. A survey in 2005 recorded five breeding pairs in the SPA, while nine pairs had been recorded in the 1998-2000 period. These numbers recorded in 2005 represent 3.7 % of the all-Ireland total. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the E.U. Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to c. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey.

The site is also a traditional breeding site for a pair of Peregrine. Merlin has been recorded within the site but further survey is required to determine its status. Red Grouse is found on some of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed.



The Slievefelim to Silvermines Mountains SPA is of ornithological importance because it provides excellent nesting and foraging habitat for breeding Hen Harrier and is one of the top sites in the country for the species. The presence of three species, Hen Harrier, Merlin and Peregrine, which are listed on Annex I of the E.U. Birds Directive is of note.

**Site Name: Lower River Shannon SAC****Site Code: 002165**

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarne. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [1110] Sandbanks
- [1130] Estuaries
- [1140] Tidal Mudflats and Sandflats
- [1150] Coastal Lagoons\*
- [1160] Large Shallow Inlets and Bays
- [1170] Reefs
- [1220] Perennial Vegetation of Stony Banks
- [1230] Vegetated Sea Cliffs
- [1310] *Salicornia* Mud
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [3260] Floating River Vegetation
- [6410] *Molinia* Meadows
- [91E0] Alluvial Forests\*
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1349] Bottle-nosed Dolphin (*Tursiops truncatus*)
- [1355] Otter (*Lutra lutra*)

The Shannon and Fergus Rivers flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian rocks and the western stretches through Carboniferous limestone. The Mulkear flows through Lower Palaeozoic rocks in the upper reaches before passing through Namurian rocks, followed by Lower Carboniferous shales and Carboniferous limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River estuary.

Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some eelgrass (*Zostera* spp.) beds and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a *Macoma-Scrobicularia-Nereis* community.

In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. For example, swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and club-rushes (*Scirpus maritimus*, *S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triquetra*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*).

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glauca maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Sea-spurrey

(*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus estuary: a type of robust saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the species Common Saltmarsh-grass (*P. maritima*) and Hard-grass (*Parapholis strigosa*).

Saltmarsh vegetation also occurs around a number of lagoons within the site, two of which have been surveyed as part of a National Inventory of Lagoons. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa*, *Cerastoderma glaucum*, *Lekanesphaera hookeri*, *Palaemonetes varians*, *Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of stonewort (*Chara canescens* and *Chara cf. connivens*).

Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris* subsp. *maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*), Thrift and plantains (*Plantago* spp.). A rare endemic type of sea-lavender, *Limonium recurvum* subsp. *pseudotranswallianum*, occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Common Bird's-foot-trefoil (*Lotus corniculatus*).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top, and below this each of the shores has different characteristic species giving a range of different shore types.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of the Purple Sea Urchin *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with

gullies of sand between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18 m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as *Fucus* spp., *Ascophyllum nodosum* and kelps), shingle beaches (with species such as Sea Beet, Sea Mayweed - *Matricaria maritima*, Sea Campion and Curled Dock - *Rumex crispus*), sandbanks which are slightly covered by sea water at all times (e.g. in the area from Kerry Head to Beal Head) and sand dunes (a small area occurs at Beal Point, where Marram - *Ammophila arenaria* is the dominant species).

Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon is broad, generally slow flowing and naturally eutrophic; the Fergus is smaller and alkaline; while the narrow, fast flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes (*Juncus* spp.) and sedges (*Carex* spp.), and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*C. pallescens*).

Floating river vegetation characterised by species of water-crowfoot (*Ranunculus* spp.), pondweeds (*Potamogeton* spp.) and the moss *Fontinalis antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to Co. Limerick.

Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50 m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with Rusty Willow (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis*. The herbaceous layer consists of tall perennial herbs. A fringe of bulrush (*Typha* sp.) occurs on the river side of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species, with occasional Pedunculate Oak (*Quercus robur*), elm (*Ulmus glabra* and *U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and

the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich.

While woodland is infrequent within the site, however Cahiracon Wood contains a strip of old oak woodland. Sessile Oak (*Q. petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmateia*) and Pendulous Sedge (*Carex pendula*).

In the low hills to the south of the Slievefelim Mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2 km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of birch (*Betula* spp.), Hazel, oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora features prominent Great wood-rush and Bilberry (*Vaccinium myrtillus*), along with a typical range of woodland herbs. Bracken (*Pteridium aquilinum*) is a feature in areas where there is more light available.

The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north-east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, oak and birch. There is a good scrub layer with Hawthorn, willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open, with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The Hazel is actively coppiced in places.

There is a small area of actively regenerating cut-away raised bog at Ballyrorheen. It is situated approximately 5 km north-west of Cappamore in Co. Limerick. The bog contains some wet areas with good cover of bog mosses (*Sphagnum* spp.). Species of particular interest include Cranberry (*Vaccinium oxycoccos*) and White Sedge (*Carex curta*), along with two regionally rare mosses, including the bog moss *S. fimbriatum*. The site is being invaded by Downy Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of Rhododendron (*Rhododendron ponticum*) has greatly reduced the overall value of the site.

A number of plant species that are listed in the Irish Red Data Book occur within the site, and several of these are protected under the Flora (Protection) Order, 1999. These include Triangular Club-rush (*Scirpus triquetrus*), a species which is only found in Ireland only in the Shannon Estuary, where it borders creeks in the inner estuary. Opposite-leaved Pondweed (*Groenlandia densa*) is found in the Shannon where it passes through Limerick City, while Meadow Barley (*Hordeum secalinum*) is abundant in saltmarshes at Ringmoylan and Mantlehill. Hairy Violet (*Viola hirta*) occurs in the Askeaton/Foynes area. Golden Dock (*Rumex maritimus*) is noted as occurring in the River Fergus estuary. Finally, Bearded Stonewort (*Chara canescens*), a brackish water specialist, and Convergent Stonewort (*Chara connivens*) are both found in Shannon Airport Lagoon.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found, but none were seen in 1993/94.

Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96), Teal (2,319; 1995-96), Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719; 1995/96), Black-tailed Godwit (1,062; 1995/96), Curlew (1,504; 1995/96), Redshank (3,228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregrine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4,010 individuals at Loop Head, 1987).

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be  $140 \pm 12$  individuals. Otter, a species also listed on Annex II of this Directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of lamprey.

Two additional fish species of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon.

Freshwater Pearl Mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.

There is a wide range of land uses within the site. The most common use of the terrestrial parts is grazing by cattle, and some areas have been damaged through over-grazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus estuary). Further, reclamation continues to pose a threat, as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale.

In the past, cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory, except in the upper estuary where it reflects the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences of industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.

Fishing is a main tourist attraction on the Shannon and there are a large number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.



**Site Name: Lower River Suir SAC****Site Code: 002137**

Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary. The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford.

Upstream of Waterford city, the swinging meanders of the Suir criss-cross the Devonian sandstone rim of hard rocks no less than three times as they leave the limestone-floored downfold below Carrick-on-Suir. In the vicinity of Carrick-on-Suir the river follows the limestone floor of the Carrick Syncline. Upstream of Clonmel the river and its tributaries traverse Upper Palaeozoic Rocks, mainly the Lower Carboniferous Viséan and Tournaisian. The freshwater stretches of the Clodiagh River in Co. Waterford traverse Silurian rocks, through narrow bands of Old Red Sandstone and Lower Avonian Shales, before reaching the carboniferous limestone close to its confluence with the Suir. The Aherlow River flows through a Carboniferous limestone valley, with outcrops of Old Red Sandstone forming the Galtee Mountains to the south and the Slievenamuck range to the north. Glacial deposits of sands and gravels are common along the valley bottom, flanking the present-day river course.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

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| <p>[1330] Atlantic Salt Meadows<br/> [1410] Mediterranean Salt Meadows<br/> [3260] Floating River Vegetation<br/> [6430] Hydrophilous Tall Herb Communities<br/> [91A0] Old Oak Woodlands<br/> [91E0] Alluvial Forests*<br/> [91J0] Yew Woodlands*</p> <p>[1029] Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>)<br/> [1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>)<br/> [1095] Sea Lamprey (<i>Petromyzon marinus</i>)<br/> [1096] Brook Lamprey (<i>Lampetra planeri</i>)<br/> [1099] River Lamprey (<i>Lampetra fluviatilis</i>)</p> |
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- [1103] Twaite Shad (*Alosa fallax*)  
 [1106] Atlantic Salmon (*Salmo salar*)  
 [1355] Otter (*Lutra lutra*)

Alluvial wet woodland is a declining habitat type in Europe as a result of drainage and reclamation. The best examples of this type of woodland in the site are found on the islands just below Carrick-on-Suir and at Fiddown Island. Species occurring here include Almond Willow (*Salix triandra*), White Willow (*S. alba*), Rusty Willow (*S. cinerea* subsp. *oleifolia*), Osier (*S. viminalis*), with Yellow Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Pendulous Sedge (*Carex pendula*), Meadowsweet (*Filipendula ulmaria*) and Common Valerian (*Valeriana officinalis*). The terrain is littered with dead trunks and branches and intersected with small channels which carry small streams to the river. The bryophyte and lichen floras appear to be rich. A small plot is currently being coppiced and managed by the National Parks and Wildlife Service. In the drier areas species such as Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*) occur.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the floodplain of the river is intact. Characteristic species of the habitat include Meadowsweet, Purple Loosestrife (*Lythrum salicaria*), Marsh Ragwort (*Senecio aquaticus*), Ground Ivy (*Glechoma hederacea*) and Hedge Bindweed (*Calystegia sepium*).

Old oak woodlands are also of importance at the site. The best examples are seen in Portlaw Wood which lies on both sides of the Clodiagh River. On the south-facing side the stand is more open and the oaks (mainly Pedunculate Oak, *Quercus robur*) are well grown and spreading. Ivy (*Hedera helix*) and Bramble (*Rubus fruticosus* agg.) are common on the ground, indicating relatively high light conditions. Oak regeneration is dense, varying in age from 0-40 years and Holly (*Ilex aquifolium*) is fairly common but mostly quite young. Across the valley, by contrast, the trees are much more closely spaced and though taller, are poorly grown on average. There are no clearings; large oaks extend to the boundary wall. In the darker conditions, Ivy is much rarer and Holly much more frequent, forming a closed canopy in places. Oak regeneration is uncommon since there are as yet few natural clearings. The shallowness of the soil on the north-facing slope probably contributes to the poor tree growth there. The acid nature of the substrate has induced a 'mountain' type oakwood community to develop. The site is quite species-rich throughout, including an abundance of mosses, liverworts and lichens. The rare lichen *Lobaria pulmonaria*, an indicator of ancient woodlands, is found here.

Inchinquilib Wood consists of three small separate sloping blocks of woodland in a valley cut by the young Miltien River and its tributaries through acidic Old Red Sandstone and Silurian rocks. Two blocks, both with an eastern aspect, located to the north of the road, are predominantly of Sessile Oak (*Quercus petraea*) and Hazel, with Downy Birch (*Betula pubescens*), Ash and Holly. The ground flora is quite mixed with,

for example, Wood-sedge (*Carex sylvatica*), Bluebell (*Hyacinthoides non-scripta*), Primrose (*Primula vulgaris*), Wood-sorrel (*Oxalis acetosella*), Pignut (*Conopodium majus*) and Hard Fern (*Blechnum spicant*). The base poor nature of the underlying rock is to some extent masked by the overlying drift. The third block, to the south of the road, and with a northern aspect, is a similar although less mature mixture of Sessile Oak, Birch and Holly. Here the influence of the drift is more marked, with the occurrence of Wood Anemone (*Anemone nemorosa*) amongst the ground flora.

Two stands of Yew (*Taxus baccata*) woods, a rare habitat in Ireland and the E.U., occur within the site. These are on limestone ridges at Shanbally and Cahir Park. Both are in woods planted with non-native species, including conifers. However, the area at Cahir Park is fairly substantial in size and includes some relatively undisturbed patches of wood and some very old trees. Regeneration of the Yew trees is mostly poor, due to competition from species such as Sycamore (*Acer pseudoplatanus*) and, at Shanbally, due to heavy grazing by goats. Other native species which occur with the Yew trees include Ash, Pedunculate Oak, Hazel and Spindle (*Euonymus europaeus*). Future prospects for these Yew woods are good as the sites are proposed for restoration under a Coillte E.U. LIFE programme.

Floating river vegetation is evident in the freshwater stretches of the River Suir and along many of its tributaries. Typical species found include Canadian Pondweed (*Elodea canadensis*), water-milfoils (*Myriophyllum* spp.), Fennel Pondweed (*Potamogeton pectinatus*), Curled Pondweed (*P. crispus*), Perfoliate Pondweed (*P. perfoliatus*), Pond Water-crowfoot (*Ranunculus peltatus*), other crowfoots (*Ranunculus* spp.) and the moss *Fontinalis antipyretica*. At a couple of locations along the river Opposite-leaved Pondweed (*Groenlandia densa*) occurs. This species is protected under the Flora (Protection) Order, 1999.

The Aherlow River is fast flowing and mostly follows a natural unmodified river channel. Submerged vegetation includes the aquatic moss *Fontinalis antipyretica* and Stream Water-crowfoot (*R. pencillatus*), while shallow areas support species such as Reed Canary-grass (*Phalaris arundinacea*), Brooklime (*Veronica beccabunga*) and Water Mint (*Mentha aquatica*). The river bank is fringed in places with Alder (*Alnus glutinosa*) and willows (*Salix* spp.).

The Multeen River is fast flowing, mostly gravel-bottomed and appears to follow a natural unmodified river channel. Water-crowfoots occur in abundance and the aquatic moss *Fontinalis antipyretica* is also common. In sheltered shallows, species such as Water-cress (*Nasturtium officinale*) and water-starworts (*Callitriche* spp.) occur. The river channel is fringed for most of its length with Alder, Willow and a narrow strip of marshy vegetation.

Salt meadows occur below Waterford City in old meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing rivers below Little Island. There are very narrow, non-continuous bands of this habitat along both banks. More extensive areas are also seen along the south bank at Ballynakill, the east side of Little Island, and in three large salt meadows

between Ballynakill and Cheekpoint. The Atlantic and Mediterranean sub-types are generally intermixed. The species list is extensive and includes Red Fescue (*Festuca rubra*), oraches (*Atriplex* spp.), Sea Aster (*Aster tripolium*), Sea Couch (*Elymus pycnanthus*), frequent Sea Milkwort (*Glaux maritima*), occasional Wild Celery (*Apium graveolens*), Parsley Water-dropwort (*Oenanthe lachenalii*), English Scurvygrass (*Cochlearia anglica*) and Sea Arrowgrass (*Triglochin maritima*). These species are more representative of the Atlantic sub-type of the habitat. Common Cord-grass (*Spartina anglica*), is rather frequent along the main channel edge and up the internal channels. The legally protected (Flora (Protection) Order, 1999) Meadow Barley (*Hordeum secalinum*) grows at the landward transition of the saltmarsh. Sea Rush (*Juncus maritimus*), an indicator of the Mediterranean salt meadows, also occurs.

Other habitats at the site include wet and dry grassland, marsh, reedswamp, improved grassland, coniferous plantations, deciduous woodland, scrub, tidal river, stony shore and mudflats. The most dominant habitat adjoining the river is improved grassland, although there are wet fields with species such as Yellow Iris, Meadowsweet, rushes (*Juncus* spp.), Meadow Buttercup (*Ranunculus acris*) and Cuckooflower (*Cardamine pratensis*).

Cabragh marshes, just below Thurles, lie in a low-lying tributary valley into which the main river floods in winter. Here there is an extensive area of Common Reed (*Phragmites australis*) with associated marshland and peaty fen. The transition between vegetation types is often well displayed. A number of wetland plants of interest occur, in particular the Narrow-leaved Bulrush (*Typha angustifolia*), Bottle Sedge (*Carex rostrata*) and Blunt-flowered Rush (*Juncus subnodulosus*). The marsh is naturally eutrophic but it has also the nutritional legacy of the former sugar factory which discharged into it through a number of holding lagoons, now removed. Production is high, which is seen in the size of such species as Celery-leaved Buttercup (*Ranunculus sceleratus*), as well as in the reeds themselves.

Throughout the Lower River Suir site are small areas of woodland other than those described above. These tend to be a mixture of native and non-native species, although there are some areas of semi-natural wet woodland with species such as Ash and willow. Cahir Park Woodlands is a narrow tract of mixed deciduous woodland lying on the flat-lying floodplain of the River Suir. This estate woodland was planted over one hundred years ago and it contains a large component of exotic tree species. However, due to original planting and natural regeneration there is now a good mix of native and exotic species. About 5 km north-west of Cashel, Ardmayle pond is a long, possibly artificial water body running parallel to the River Suir. It is partly shaded by planted Lime (*Tilia* hybrids), Sycamore and the native Alder. Growing beneath the trees are shade tolerant species such as Remote sedge (*Carex remota*).

The site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (both *Margaritifera margaritifera* and *M. margaritifera* subsp. *durrovensis* occur), White-clawed Crayfish, Salmon, Twaite Shad (*Alosa fallax fallax*), three species of Lampreys - Sea Lamprey, Brook

Lamprey and River Lamprey, and Otter. This is one of only three known spawning grounds in the country for Twaite Shad.

The site also supports populations of several other animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat, Natterer's Bat, Pipistrelle Bat, Pine Marten, Badger, Irish Hare, Smelt and Common Frog. Breeding stocks of Carp are found in Kilsheelan Lake. This is one of only two lakes in the country which is known to have supported breeding Carp. Carp require unusually high summer water temperatures to breed in Ireland. As the site is therefore unusual in this regard, it may also support interesting invertebrate populations.

Parts of the site have also been identified as of ornithological importance for a number of Annex I (E.U. Birds Directive) bird species, including Greenland White-fronted Goose (10), Golden Plover (1,490), Whooper Swan (7) and Kingfisher. Figures given in brackets are the average maximum counts from four count areas within the site for the three winters 1994-1997. Wintering populations of migratory birds use the site. Flocks are seen in Coolfinn Marsh and also along the reedbeds and saltmarsh areas of the Suir. Coolfinn supports nationally important numbers of Greylag Goose on a regular basis, with numbers between 600 and 700 recorded. Other species occurring include Mallard (21), Teal (159), Widgeon (26), Tufted Duck (60), Pintail (4), Pochard (2), Little Grebe (2), Black-tailed Godwit (20), Oystercatcher (16), Lapwing (993), Dunlin (101), Curlew (195), Redshank (28), Greenshank (4) and Green Sandpiper (1). Nationally important numbers of Lapwing (2,750) were recorded at Faithlegg in the winter of 1996/97. In Cabragh marshes there is abundant food for surface feeding wildfowl which total approximately 1,000 in winter. Widgeon, Teal and Mallard are numerous, and the latter has a large breeding population, with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive, occurs along some of the many tributaries throughout the site.

Land use at the site consists mainly of agricultural activities including grazing, silage production, fertilising and land reclamation. The grassland is intensively managed and the rivers are therefore vulnerable to pollution from run-off of fertilisers and slurry. Arable crops are also grown. Fishing is a main tourist attraction on stretches of the Suir and some of its tributaries, and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. The Aherlow River is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other recreational activities such as boating, golfing and walking are also popular. Several industrial developments, which discharge into the river, border the site including three dairy related operations and a tannery.

The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animal species, some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The presence of two

legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds further to the ecological interest and importance.

**Site Name: Anglesey Road SAC****Site Code: 002125**

Anglesey Road is a steep-sided valley which extends approximately 1.8 km along the Multeen River to the north of Hollyford village, Co. Tipperary. Most of the site lies between 210 and 270 m above sea level.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[6230] Species-rich <i>Nardus</i> Grassland*
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The unimproved, species-rich upland grassland at this site is mainly dominated by grasses such as bents (*Agrostis* spp.), Crested Dog's-tail (*Cynosurus cristatus*), Sheep's-fescue (*Festuca ovina*) and Wavy Hair-grass (*Deschampsia flexuosa*). Herbs present include Heath Bedstraw (*Galium saxatile*), Tormentil (*Potentilla erecta*), violets (*Viola* spp.) and speedwells (*Veronica* spp.). Localised patches of heathy grassland contain Heather (*Calluna vulgaris*) and Bilberry (*Vaccinium myrtillus*). Bracken (*Pteridium aquilinum*) cover is extensive and there are scattered shrubs of Hawthorn (*Crataegus monogyna*).

On the steep valley sides and in stream gullies scrub comprised of willow (*Salix* spp.), Downy Birch (*Betula pubescens*), Rowan (*Sorbus aucuparia*), Hazel (*Corylus avellana*), Hawthorn and Ash (*Fraxinus excelsior*) has developed.

Agricultural improvement and afforestation are the main threats to the site.

Anglesey Road is a comparatively small site which contains a range of habitat types and species. It is of particular importance for the good quality examples of species-rich, unimproved, upland grassland found. This habitat is becoming increasingly rare in Ireland and Europe, and is listed on Annex I of the E.U. Habitats Directive with priority status.

**Site Name: Bolingbrook Hill SAC****Site Code: 002124**

Situated approximately 6 km south-east of Silvermines village in Co. Tipperary, this upland site comprises Bolingbrook Hill and the nearby eastern slopes of Silvermine Mountains in Curryquin and Mucklin townlands. Most of the land is above 270 m and the highest point is at 404 m.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath  
 [4030] Dry Heath  
 [6230] Species-rich *Nardus* Grassland\*

Unimproved, species-rich upland grassland covers the lower slopes of Bolingbrook Hill and much of Curryquin. The dominant grasses found are Mat-grass (*Nardus stricta*), bent grasses (*Agrostis* spp.) and Crested Dog's-tail (*Cynosurus cristatus*). Moss and Bracken (*Pteridium aquilinum*) cover is extensive. The herb component is diverse and many fields have gorse (*Ulex* sp.) scrub or scattered Hawthorn (*Crataegus monogyna*) shrubs. Other species present include Heath Bedstraw (*Galium saxatile*), Sheep's-fescue (*Festuca ovina*), Devil's-bit Scabious (*Succisa pratensis*), Tormentil (*Potentilla erecta*), Lousewort (*Pedicularis sylvatica*) and Mat-grass.

A small area of blanket bog occurs on the western side of Bolingbrook Hill. Its margins are damaged by former peat-cutting activities. Some blanket bog also occurs in Mucklin. Wet heath is the main habitat in the western part of this site, usually occurring in close association with acidic grassland. Heath species present include Heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*), Bog-myrtle (*Vaccinium myrtillus*), Heath Rush (*Juncus squarrosus*), Deergass (*Scirpus cespitosus*), Purple Moor-grass (*Molinia caerulea*), Green-ribbed Sedge (*Carex binervis*) and Tormentil. In the wetter areas, Bog Asphodel (*Narthecium ossifragum*) and Greater Sundew (*Drosera rotundifolia*) occur. Mosses are a feature, especially bog mosses (*Sphagnum* spp.). On some of the steeper slopes where the peaty soils are thin, good quality dry heath occurs. Typical species here include Heather, Mat-grass, Common Bent (*Agrostis capillaris*), Tormentil, Bell heather (*Erica cinerea*) and Western Gorse (*Ulex gallii*), and moss cover is extensive in places. Scrub comprised of willow (*Salix* spp.), Hawthorn, Rowan (*Sorbus aucuparia*), Ash (*Fraxinus excelsior*) and Blackthorn (*Prunus spinosa*) has also developed on parts of the steep slopes.



A good diversity of animal species associated with peatland habitats occurs, including Irish Hare, Red Grouse, Common Frog and Viviparous Lizard.

Agricultural improvement and afforestation are the main threats to the site. Much of the surrounding land is extensively planted with conifers.

Bolingbrook Hill is a comparatively small site which contains a range of habitats, and species, including three habitat types listed on the E.U. Habitats Directive. It is of particular importance for the good quality examples of species-rich, unimproved upland grassland found. This habitat is becoming increasingly rare in Ireland and Europe and is listed with priority status in the Directive. The presence of good quality wet and dry heath, which are also listed on this Annex, contributes to the overall importance of the site.

**Site Name: Keeper Hill SAC****Site Code: 001197**

Keeper Hill, or Slievekimalta, is situated between the Silvermines and Slieve Felim Mountains, 13 km south of Nenagh in Co. Tipperary. Reaching an altitude of 695 m, this rounded, rather steep peak of Old Red Sandstone is notably higher than any of the surrounding upland areas. The site includes the summit and slopes above 250 m which have not yet been afforested.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath  
[7130] Blanket Bogs (Active)\*

Mountain blanket bog at this site is dominated by cottongrasses (*Eriophorum* spp.), Deergrass (*Scirpus cespitosus*), Purple Moor-grass (*Molinia caerulea*) and Heather (*Calluna vulgaris*). The moss layer is well developed with a deep bog moss (*Sphagnum* spp.) cover. The relatively uncommon *Sphagnum russowii* has been reported from this habitat. Other species recorded include Crowberry (*Empetrum nigrum*), Bog Asphodel (*Narthecium ossifragum*) and the moss *Racomitrium lanuginosum*.

Heath occurs where the depth of peat is shallow. This is found at the summit, where peat has eroded, on the steep slopes and also in mosaic with blanket bog. The heath is predominantly wet heath, with Heather, Cross-leaved Heath (*Erica tetralix*), Purple Moor-grass, Bilberry (*Vaccinium myrtillus*) and Heath Rush (*Juncus squarrosus*) being the most common species. Bog mosses are also well represented. On the higher areas, Cowberry (*Vaccinium vitis-idaea*) and Crowberry, species indicative of alpine heath, occur. On the lower slopes the heath forms a mosaic with wet grassland and here patches of Gorse (*Ulex europaeus*) scrub occur.

Upland grassland occurs on mineral soils on the lower slopes and is especially well-developed on the southern and northern slopes. The dominant species are Sheep's-fescue (*Festuca ovina*), Mat-grass (*Nardus stricta*), Common Bent (*Agrostis capillaris*), Tormentil (*Potentilla erecta*) and Heath Bedstraw (*Galium saxatile*). In wetter areas, rush species such as *Juncus effusus* and *J. articulatus* become dominant.

Peregrine Falcon, a species listed in Annex I of the E.U. Birds Directive, breeds within the site. Red Grouse occur amongst the tall heather east of the summit.

Land use within the site consists of some peat cutting to the north-west of the summit and some track development. Grazing is minimal and confined to the lower grassy slopes to the north of the site. The site is almost entirely surrounded by coniferous forest plantations and this remains the greatest threat.

This site is of considerable conservation value due to the presence of two habitats which are listed on Annex I of the E.U. Habitats Directive, one of which has priority status. The presence of important bird species adds to the importance of the site.

**Site Name: Silvermine Mountains SAC****Site Code: 000939**

This small site is situated on the northern slopes of the Silvermine Mountains, 1 km south-east of Silvermines village in Co. Tipperary. It slopes steeply uphill from 240 m in the north-west corner to 400 m at the southern boundary. The geology of the area is sandstone of different ages - older Silurian on the central part of the mountain, while the outer parts are composed of yellowish and red sandstones of Devonian age.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath  
[6230] Species-rich *Nardus* Grassland\*

The site supports species-rich *Nardus* grasslands on siliceous substrates. This grassland occurs in two separate locations on either side of the road which cuts through the site. Typical species associated with the habitat and recorded at the site include Heath Bedstraw (*Galium saxatile*), Sheep's-fescue (*Festuca ovina*), Bitter-vetch (*Lathyrus montanus*), Heath Milkwort (*Polygala serpyllifolia*), Lesser Butterfly-orchid (*Platanthera bifolia*), Greater Butterfly-orchid (*P. chlorantha*), Lousewort (*Pedicularis sylvatica*), Tormentil (*Potentilla erecta*), Mat-grass (*Nardus stricta*) and Small-white Orchid (*Pseudorchis albida*).

Heath is the most extensive habitat of the site and is dominated by Heather (*Calluna vulgaris*), Purple Moor-grass (*Molinia caerulea*) and Bilberry (*Vaccinium myrtillus*), and occurs mainly on peaty soils. Localised, flushed, wet areas dominated by rushes (*Juncus effusus* and *J. acutiflorus*), with Marsh Arrowgrass (*Triglochin palustris*), Meadow Thistle (*Cirsium dissectum*) and Common Butterwort (*Pinguicula vulgaris*) are also present.

Scrub vegetation dominated by Rowan (*Sorbus aucuparia*), Rusty Willow (*Salix cinerea* subsp. *oleifolia*), Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), and grading into Downy Birch (*Betula pubescens*), is well developed in the more inaccessible areas, such as the gullies at the western edge of the site. In places it encroaches on to grassland, probably due to under-grazing. Dense Bracken (*Pteridium aquilinum*) is also present.

Red Grouse is known from the site, as well as the Irish Hare, Common Frog and Common Lizard.

The occurrence of the Small-white Orchid at this site is of particular note as it is a Red Data Book species which is legally protected under the Flora (Protection) Order, 1999.

Land use within the site is confined to low density grazing by cattle, sheep and perhaps horses.

This site is of conservation importance due to the presence of two habitats listed in Annex I of the E.U. Habitats Directive, namely wet heath and species-rich *Nardus* grassland, the latter being listed with priority status. The occurrence of the rare Small-white Orchid adds significantly to the value of the site.

**Site Name: Silvermines Mountains West SAC****Site Code: 002258**

Silvermines Mountains West SAC is situated to the north of Keeper Hill, about 10 km south of Nenagh in Co. Tipperary. Reaching an altitude of 489 m, this rather steep ridge of Old Red Sandstone is visibly very prominent in the landscape when viewed from the Nenagh to Limerick road. The site includes the summit and slopes, mostly above 200 m, to the west of an extensively afforested area south of the town of Silvermines.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath  
 [4030] Dry Heath  
 [6130] Calaminarian Grassland

The main habitats that occur within Silvermines Mountains West SAC are heath (mostly wet heath but some dry heath) and unimproved upland grassland. The wet heath is particularly well developed with tall stands of Heather (*Calluna vulgaris*) and a high cover of bog mosses (*Sphagnum* spp.). Other species of wet heath include Deergrass (*Scirpus cespitosus*), cottongrasses (*Eriophorum angustifolium* and *E. vaginatum*), Purple Moor-grass (*Molinia caerulea*), Cross-leaved Heath (*Erica tetralix*), Tormentil (*Potentilla erecta*) and Heath Rush (*Juncus squarrosus*). Smaller areas of more species-rich wet heath with Hard Fern (*Blechnum spicant*), Mat-grass (*Nardus stricta*) and Great Wood-rush (*Luzula sylvatica*) also occur. From east to west there is a gradation from wet to dry heath, and from peaty to mineral soil. Dry heath, characterised by Western Gorse (*Ulex gallii*) and Bell Heather (*Erica cinerea*), is also found on the more steeply sloping ground below the summit ridge and on outcropping rock exposures. Gorse (*Ulex europaeus*) has invaded dry heath areas on the sides of some of the streams. Patchy remnants of blanket bog occur on the summit plateau in places and there is evidence of extensive former peat-cutting here.

Calaminarian Grassland vegetation is extensive (0.9 ha) and well developed at Shallee, an extensive old lead mine on the northern side of the site, with much the largest of the four Irish populations of the rare moss *Ditrichum plumbicola* and a tiny amount of the rare liverwort *Cephaloziella nicholsonii*. Threats are obvious from ongoing restoration work on an engine house ruin, and existence of large areas of derelict land with rusting oil drums, cables and dangerous open adits and workings.

Upland grassland is widespread on the lower mountain slopes, in many of the upper fields and on the steep south-facing slopes. Grassland also extends up onto the ridge at the western end of the site. Common species that characterise this acid grassland vegetation include Sheep's-fescue (*Festuca ovina*), Mat-grass, Common Bent (*Agrostis capillaris*), Crested Dog's-tail (*Cynosurus cristatus*), Germander Speedwell (*Veronica chamaedrys*), Tormentil, Heath Bedstraw (*Galium saxatile*) and a range of mosses such as *Rhytidiadelphus squarrosus*, *Hylocomium splendens* and *Brachythecium rutabulum*. Parts of the lower southern slopes are covered with dense Bracken (*Pteridium aquilinum*).

A number of small streams and flushes descend the slopes. These sometimes support a richer vegetation, with plants such as rushes (*Juncus effusus* and *J. articulatus*), sedges (*Carex nigra*, *C. panicea*, *C. lepidocarpa*, *C. echinata*, *C. ovalis* and *C. pulicaris*) and a variety of herbs, including Meadowsweet (*Filipendula ulmaria*), Ragged-Robin (*Lychnis flos-cuculi*), Bog Pimpernel (*Anagallis tenella*), Water Mint (*Mentha aquatica*) and Marsh Violet (*Viola palustris*).

The site is also important for birds. Up to 11 pairs of Hen Harriers are known to use these uplands as part of a wider range between Silvermines and Slieve Felim to the south. Hen Harriers are uncommon birds, and are listed under Annex I of the E.U. Birds Directive. The Silvermines provide useful foraging habitat for some of these birds.

The vegetation at this site is in good condition, with low grazing pressure throughout and no signs of over-grazing. One fifth of the site was burned in 2003 and there is evidence of former burning in another fifth. Former peat-cutting has occurred on the summit plateau and parts of the northern slopes. Afforestation, which is widespread to the east of the site, remains the greatest threat.

The site is of conservation importance for its heath and grassland vegetation, and as a foraging area for Hen Harrier, and is one of the only extensive unplanted uplands remaining in north Tipperary.

**Site Name: Philipston Marsh SAC****Site Code: 001847**

Philipston Marsh is a small wetland near Philipston House, south of Cappagh White in Co. Tipperary. It represents one of only two examples of calcareous fen and mire vegetation in the Mulkear River catchment and is thus a rare habitat type in this locality.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[7140] Transition Mires
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The marsh supports a dense reedbed of Common Reed (*Phragmites australis*) and patches of Rusty Willow (*Salix cinerea* subsp. *oleifolia*) scrub on its northern margins. The southern part is flushed with calcareous groundwater issuing from the base of a gentle slope. This area supports a very species-rich mosaic of fen and transition mire plant communities, amongst which are found several uncommon species, including Broad-leaved Cottongrass (*Eriophorum latifolium*), Marsh Helleborine (*Epipactis palustris*), Fen Bedstraw (*Galium uliginosum*), Lesser Tussock-sedge (*Carex diandra*) and Long-stalked Yellow-sedge (*C. lepidocarpa*). Typical rich fen bryophytes, such as *Campylium stellatum*, *Drepanocladus revolvens*, *Ctenidium molluscum*, *Fissidens adianthoides*, *Philonotis calcarea* and *Palustriella commutate*, are largely confined to Philipston Marsh within the Mulkear River catchment.

This undisturbed fen and mire system supports an unusual and diverse assemblage of plant communities and is particularly important for its transition mire, a habitat listed on Annex I of the E.U. Habitats Directive.



**Site Name: Kilduff, Devilsbit Mountain SAC****Site Code: 000934**

This upland site is situated approximately 6 km north-west of Templemore in Co. Tipperary. It comprises the summit of Devilsbit Mountain and much of the eastern side of the ridge which extends northwards to Kilduff Mountain. Most of the site lies above 250 m and the highest point is 480 m. Devilsbit Mountain is composed of Silurian grits.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[4030] Dry Heath  
[6230] Species-rich *Nardus* Grassland\*

The main habitats found within the site are upland grassland, heath and woodland. Heath dominates the upper slopes and the summit of Devilsbit Mountain, and the site contains small areas of good quality dry heath.

Upland acid grassland covers extensive areas, and is relatively herb-rich. There is a diversity of vegetation communities found, as well as plant species. Populations of the rare Small-white Orchid (*Pseudorchis albida*), a species which is protected under the Flora (Protection) Order, 1999, occur in such areas of unimproved grassland. Associated species include Sheep's-fescue (*Festuca ovina*), Great Wood-rush (*Luzula sylvatica*), Devil's-bit Scabious (*Succisa pratensis*) and Bracken (*Pteridium aquilinum*).

The central wooded area is a relic of former planting. Small groves of mature Beech (*Fagus sylvatica*) and oak (*Quercus* sp.) trees persist on the higher slopes. Naturally-regenerating Alder (*Alnus glutinosa*) woodland with willow (*Salix* spp.) dominates a wet area traversed by streams near the eastern boundary of the site. Elsewhere on the site, woodland is mixed and comprises Beech, Alder, Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*) and Hawthorn (*Crataegus monogyna*).

Peregrine, a species listed on Annex I of the E.U. Birds Directive, breeds within the site.

The site is heavily grazed by cattle and sheep. Agricultural improvement and afforestation are the main threats, particularly to those areas of unimproved grassland found within the site.

The site is of conservation importance due to the presence of two habitats listed in Annex I of the E.U. Habitats Directive, dry heath and species-rich *Nardus* grassland, the latter being of priority status. The presence of the rare and protected Small-white Orchid adds significantly to the value of the site.

**Site Name: Clare Glen SAC****Site Code: 000930**

Clare Glen lies on the Limerick - Tipperary border, in the western foothills of the Slievefelim Mountains, about 10 km north-west of Cappamore. The glen was formed by the action of the Clare River cutting into the Old Red Sandstone. The site comprises the wooded river valley about 2 km above the Clare Bridge.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[91A0] Old Oak Woodlands  
 [1421] Killarney Fern (*Trichomanes speciosum*)

The woodland is of mixed composition, but most of the broadleaved species are native, including oak (*Quercus* sp.), Ash (*Fraxinus excelsior*), Rowan (*Sorbus aucuparia*) and willows (*Salix* spp.). The non-native species include Beech (*Fagus sylvatica*) and several conifer species. In the shrub layer native species include Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Holly (*Ilex aquifolium*), but also the non-native Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*). The ground vegetation includes species such as Hard Fern (*Blechnum spicant*), Wood-sorrel (*Oxalis acetosella*) and Ivy (*Hedera helix*).

A rich bryophyte flora is associated with the river and the wet rocks around it, including the rare mosses *Amblystegium fluviatile*, *Fissidens exiguus* and *Pohlia campotrachela*, and the liverworts *Lejeunea holtii*, *Colura calyptrifolia* and *Dumortiera hirsuta*. The site is also notable for the presence of several rare species of Myxomycete fungus, namely *Fuligo muscorum*, *Stemonitopsis hyperopta* and *Licea testudinacea*, the last-named in one of only two known Irish sites.

The site is of further importance for the presence of the rare and legally protected (Flora (Protection) Order, 1999) Killarney Fern (*Trichomanes speciosum*).

The woodland, although planted with many exotic trees, is mature and conforms to a type listed on Annex II of the E.U. Habitats Directive. The site is scenic and popular as an amenity area, and the presence of a number of rare and scarce species adds further to its importance.

**Site Name: Glenstal Wood SAC****Site Code: 001432**

Glenstal Wood, which is associated with Glenstal Abbey, lies in the western foothills of the Slievefelim Mountains, about 8 km north-west of Cappamore, Co. Limerick. The glen has been cut into Old Red Sandstone and runs in a north-easterly direction for about 2 km, eventually becoming a steep-sided rocky ravine.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[1421] Killarney Fern ( <i>Trichomanes speciosum</i> )
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At Glenstal Wood, oak (*Quercus* sp.) woodland remnants occur which support a rich fern, bryophyte and lichen flora. The rare lichen, *Enterographa elabora*, a species known from only three other counties in Ireland, has been recorded at the site. Some oak woodland remnants are also found about Glenstal Abbey.

The site is of conservation importance for the presence of Killarney Fern (*Trichomanes speciosum*), a rare species that is listed on Annex II of the E.U. Habitats Directive and that is also protected under the Flora (Protection) Order, 1999.

**Site Name: Slieve Bernagh Bog SAC****Site Code: 002312**

Slieve Bernagh Bog is situated to the west of Lough Derg, in the south-east of Co. Clare. The site comprises the Slieve Bernagh mountain range, with the highest peaks at Moylussa (532 m) and Cragnamurragh (526 m), and the surrounding peatlands that flank its northern slopes.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath  
 [4030] Dry Heath  
 [7130] Blanket Bogs (Active)\*

The summit plateau in Slieve Bernagh Bog SAC stretches from Lough Avullig, in the west, to Moylussa, in the east, and is dominated by mountain blanket bog of varying peat depth and condition. At the western end the terrain is undulating and some areas of peat are shallow and eroded in parts. Further east the terrain is flatter, the peat depth much greater (> 4 m) and the surface wetter. In general the vegetation is dominated by typical blanket bog species such as Deergrass (*Scirpus cespitosus*), Heather (*Calluna vulgaris*), Hare's-tail Cottongrass (*Eriophorum vaginatum*) and Common Cottongrass (*E. angustifolium*), with local differences in soil, slope and exposure determining their relative abundance. Other frequent species in the vegetation include Bog Asphodel (*Narthecium ossifragum*), Bilberry (*Vaccinium myrtillus*), Heath Milkwort (*Polygala serpyllifolia*), Purple Moor-grass (*Molinia caerulea*), Tormentil (*Potentilla erecta*), Cross-leaved Heath (*Erica tetralix*) and species characteristic of mountain blanket bog such as Crowberry (*Empetrum nigrum*) and Fir Clubmoss (*Huperzia selago*). Moss cover is variable, but in the wetter areas can be high (approx. 80% ground cover) and mainly dominated by bog mosses, such as *Sphagnum capillifolium* and *S. papillosum*, together with *Hypnum jutlandicum*, *Hylocomium splendens*, *Racomitrium lanuginosum* and occasional *Aulacomnium palustre* and *Dicranum scoparium*. Small pool systems near Moylussa contain floating carpets of *Sphagnum cuspidatum*, with patches of Common Cottongrass.

Blanket bog also occurs on the low-lying flanks of the mountain range, in the townlands of Ballybroghan and Ballydonaghan. Here the bog is much wetter, with pool systems of bog mosses, and species characteristic of western lowland blanket bog such as *Pleurozia purpurea* and *Campylopus atrovirens*.

Wet heath vegetation has developed on the slopes beneath the mountain summits and in mosaic with blanket bog on the shallower peat soils. Wet heath is especially well developed on the northern slopes below Cragnamurragh. Here the cover of Heather and Bilberry is high and a wide range of typical associates occur, including Hard Fern (*Blechnum spicant*), Cross-leaved Heath, Bell Heather (*Erica cinerea*), Crowberry, cottongrasses, Great Wood-rush (*Luzula sylvatica*), sedges (*Carex binervis*, *C. panicea* and *C. echinata*), rushes (*Juncus effusus* and *J. squarrosus*). The range of moss and liverwort species in this community is exceptionally diverse and includes a number of epiphytes growing on Eared Willow (*Salix aurita*).

On the drier, south facing slopes a dry heath community occurs in mosaic with upland grassland. Here species such as Bell Heather, Mat-grass (*Nardus stricta*), Sheep's-fescue (*Festuca ovina*), Common Bent (*Agrostis capillaris*), Tormentil and Heath Bedstraw (*Galium saxatile*) are prominent. Moss cover is low, mainly characterised by species such as *Hypnum jutlandicum*. In wetter areas, rushes (*Juncus effusus* and *J. articulatus*) become dominant.

Several species of birds, typical of open moorland, have been recorded from this site. These include Skylark, Meadow Pipit, Red Grouse, Wheatear and Raven. At least two pairs of Hen Harriers are known to occur within the Slieve Bernagh to Keeper Hill region, and birds use the cSAC for foraging habitat. This species is listed on Annex I of the E.U. Birds Directive.

The Irish Hare, a Red Data Book species, occurs within the site.

Land use within the site consists of some peat cutting to the north-west of the summit and low intensity sheep grazing confined to the lower grassy slopes. The site is, however, almost entirely surrounded by coniferous forest plantations and this remains the greatest threat.

Slieve Bernagh Bog is a site of considerable conservation importance as it contains a range of peatland types, including active blanket bog, a habitat listed with priority status under the E.U. Habitats Directive. It is one of the last remaining areas of intact open moorland habitat in this part of the country.

**Site Name: Lough Derg, North-east Shore SAC****Site Code: 002241**

Lough Derg, the lowest order lake on the River Shannon, is one of the largest bodies of freshwater in Ireland. This SAC, however, only includes the northern shore of the lake from the mouth of the Cappagh River in the north-west to just below Black Lough at the north-eastern shore. The greater part of this site lies on Carboniferous limestone, although there is Old Red Sandstone on the southern shores of the eastern section.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[5130] Juniper Scrub  
 [7210] *Cladium* Fens\*  
 [7230] Alkaline Fens  
 [8240] Limestone Pavement\*  
 [91E0] Alluvial Forests\*  
 [91J0] Yew Woodlands\*

The geology of the lake shore is principally limestone and in places this protrudes at the surface in the form of boulders and rubble, and can be classified as limestone pavement. These are often bryophyte-rich surfaces or else support a calcareous grassland or heath flora, as well as some woody species, such as Yew (*Taxus baccata*) and Juniper (*Juniperus communis*). Examples occur at Cornalack, Kyleneilly and Portumna. The last two named areas were partly afforested but are proposed for restoration under a Coillte E.U. LIFE Programme. The geographical location of these examples of limestone pavement within the country is notable.

A second priority Annex I habitat, *Cladium* fen, occurs occasionally along the lake margins, mainly in association with alkaline fens, Common Reed (*Phragmites australis*) and other swamp vegetation. Typically, Great Fen-sedge (*Cladium mariscus*), which can be up to 2 m in height, forms dense stands. Associated species include Common Reed, Black Bog-rush (*Schoenus nigricans*), Water Horsetail (*Equisetum fluviatile*), Bottle Sedge (*Carex rostrata*) and occasional Slender Sedge (*Carex lasiocarpa*). This community generally merges with alkaline fen dominated by Black Bog-rush, with Purple Moor-grass (*Molinia caerulea*), Marsh Horsetail (*E. palustre*), Meadowsweet (*Filipendula ulmaria*) and scattered tussocks of Greater Tussock-sedge (*Carex paniculata*).

Yew woods in Ireland are mostly confined to the west of the country. However, a substantial area of Yew is located on limestone at Cornalack, where Yew forms a scrub woodland along the east shore of Lough Derg. Here, Yew is found in association with small amounts of Juniper, which forms protection against grazing for the young Yew. Other notable species present include Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Small-leaved Cotoneaster (*Cotoneaster microphyllus*), along with occasional Ivy (*Hedera helix*), Wild Strawberry (*Fragaria vesca*), Bramble (*Rubus fruticosus* agg.) and Wood-sorrel (*Oxalis acetosella*). Elsewhere, small stands of Yew up to 5 m high occur with Spindle (*Euonymus europaeus*), Blackthorn (*Prunus spinosa*), Gorse (*Ulex europaeus*) and Ash (*Fraxinus excelsior*). Due to shading, and in places cattle trampling, the ground flora supports few herbs. However, the bryophyte layer is well developed with many moss covered rocks present.

Juniper occurs throughout this site in a range of habitats, associated with calcareous grasslands, heath and limestone outcrops. Some of the finest examples of Juniper formations in Ireland occur along the lake edge where upright, bushy Juniper shrubs up to 3 m tall are found. Typically, Juniper forms dense hedges with Ash, Hawthorn, Gorse, Hazel and Bramble, and occasional Yew. These tall Juniper shrubs are a unique feature in Ireland, where it is more typically found growing in prostrate form. In places along the lake shore Juniper forms a mosaic with Black Bog-rush and Great Fen-sedge fen. The best examples are seen at the north and north-east of the site. On drier ground above the flood level, Juniper occurs in association with species-rich calcareous grassland with Mouse-ear Hawkweed (*Hieracium pilosella*), Daisy (*Bellis perennis*), Lady's Bedstraw (*Galium verum*), Wild Thyme (*Thymus praecox*) and Blue Moor-grass (*Sesleria albicans*). An extensive area of this vegetation is seen north of Kilgarvan Quay. Many of the islands also support significant Juniper cover. This is particularly evident on Bounla Island. Juniper generally occurs as fringing vegetation around the islands, which typically have wooded centres. At Cornalack, along the eastern shore of Lough Derg, tall Juniper is found in association with loose limestone rubble with a significant cover of Yew.

Deciduous woodlands are also a notable feature of the site, dominated by oak (*Quercus* spp.), as at Bellevue, and Hazel/Ash at many of the examples along the north-eastern shore. Typically the ground layer includes Early-purple Orchid (*Orchis mascula*), violets (*Viola* spp.), Ivy, Lesser Celandine (*Ranunculus ficaria*), Bluebell (*Hyacinthoides non-scripta*), Wood Anemone (*Anemone nemorosa*), Wood-sorrel, Primrose (*Primula vulgaris*), Bramble, Ground Ivy (*Glechoma hederacea*), Pignut (*Conopodium majus*) and Honeysuckle (*Lonicera periclymenum*). Wet woodland is frequent along the lake shore, and in some areas this conforms well with the E.U. Annex I habitat, alluvial woodland. At Kyleneilly wood, where some planting of commercial forestry has occurred, there are extensive areas of alluvial woodland which are subject to flooding. These woods are dominated by willows (*Salix* spp.) and Alder (*Alnus glutinosa*), with Downy Birch (*Betula pubescens*) and Ash also present. The ground flora of the undisturbed alluvial sites is often dominated by Yellow Iris (*Iris pseudacorus*), with a range of other species commonly present, including Bogbean (*Menyanthes trifoliata*), Marsh-marigold (*Caltha palustris*),



Meadowsweet, Purple Loosestrife (*Lythrum salicaria*), horsetails (*Equisetum* spp.), Wild Angelica (*Angelica sylvestris*), Greater Tussock-sedge and Remote Sedge (*Carex remota*). Further examples of alluvial woodland occur at Portumna. Beech (*Fagus sylvatica*) and Scots Pine (*Pinus sylvestris*) are often present at the lake edge along areas which were once parts of estates. Some areas of coniferous forestry have been included within the site.

The only known site in the country for the Red Data Book plant Irish Fleabane (*Inula salicina*) occurs along the lake shore. This plant is legally protected under the Flora (Protection) Order, 1999. Other Red Data Book species present within this site are Marsh Pea (*Lathyrus palustris*) and Ivy Broomrape (*Orobanche hederæ*). The Red Data Book stonewort *Chara tomentosa* has its stronghold in Lough Derg.

The lake is rated as nationally important for waterfowl. The entire lake, including all of the islands, is a designated SPA (Special Protection Area). Counts from 1995/96 carried out at seven locations on the lake indicate that the lake holds nationally important numbers for Mute Swan, Cormorant, Mallard, Teal, Tufted Duck and Goldeneye. The lake also supports a number of Greenland White-fronted Goose, a bird species listed on Annex I of the E.U. Birds Directive. There is a Wildlife Sanctuary at the north western edge of the lake.

Lough Derg is of conservation interest also for its fish and freshwater invertebrates. Lampreys, listed under Annex II of the E.U. Habitats Directive, are known to occur and the lake contains an apparently self-sustaining landlocked population of Sea Lamprey (*Petromyzon marinus*). A landlocked population, where the fish are feeding and not completing a seaward migration, is unique in an Irish context, though there are several such populations in the U.S. and one is known from Loch Lomond in Scotland. Brook Lamprey (*Lampetra planeri*) is known to be common in the lower Shannon catchment where all three lamprey species breed.

The endangered fish species Pollan (*Coregonus autumnalis pollan*) is recorded from Lough Derg, one of only three sites in Ireland and in western Europe. The Pollan is a landlocked species of Coregonid or 'White Fish', thought to have colonised Irish waters after the last Ice Age. Its nearest relative, the Arctic Cisco, is found as far away as Alaska, Northern Canada and Siberia. Although it is anadromous throughout most of its northern range, the Irish population are all non-migratory and purely freshwater. Lough Derg is also a well known fishing lake with a good Trout (*Salmo trutta*) fishery. Atlantic Salmon (*Salmo salar*) also use the lake as a spawning ground. Although this species is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the E.U. Habitats Directive.

Otter and Badger have been recorded within the site. Both of these species are listed in the Irish Red Data Book and are legally protected by the Wildlife Act, 1976.

Land use within the site is mainly of a recreational nature with many boat hire companies, holiday home schemes and angling clubs located at the lake edge.

Recreational disturbance may pose a threat to the wintering wildfowl populations, though tourism is scaled down during the winter. The water body is surrounded mainly by improved pastoral farmland to the south and east, with areas of bog to the south-west and west. Coniferous plantations are present along the west and north-west shore and small areas of these are included within the site. If these areas are felled no further planting should take place as afforestation damages the wetland habitats between the plantation and lake edge.

The main threats to the quality of the site are water polluting activities resulting from intensification of agricultural activities around the lake shore, uncontrolled discharge of sewage, which is causing eutrophication of the lake, and housing and boating development which has resulted in the destruction of lakeshore habitats. There is also significant fishing and shooting pressure on and around the lake. Forestry can result in the loss of some areas of wetland habitat. The spread of Zebra Mussel (*Dreissena polymorpha*) in Lough Derg also poses a threat the ecology of the lake.

This is a site of significant ecological interest, with six habitats listed on Annex I of the E.U. Habitats Directive. Four of these are priority habitats - *Cladium* fen, alluvial woodland, limestone pavement and Yew woodland. Other annexed habitats present include alkaline fen and Juniper scrub formations on heath and calcareous grasslands. In addition, the lake itself is an SPA that supports important numbers of wintering wildfowl, Greenland White-fronted Goose, Common Tern and Cormorant, a number of which are listed under Annex I of the E.U. Birds Directive.

**Site Name: Glenomra Wood SAC****Site Code: 001013**

Glenomra Wood is a deciduous woodland located in south-east Co. Clare, about 10 km north of Limerick city.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[91A0] Old Oak Woodlands
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The dominant tree in Glenomra Wood is Downy Birch (*Betula pubescens*), which attains a height of about 20 m in places. This is mixed with Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*) and Beech (*Fagus sylvatica*) throughout. Holly (*Ilex aquifolium*) is abundant and is the main understorey species. Hazel (*Corylus avellana*), regenerating Birch, Gorse (*Ulex europaeus*) and Bramble (*Rubus fruticosus* agg.) are other understorey species. Willow (*Salix* spp.) occurs in the wetter areas.

In shaded areas the ground flora is poorly developed, but in more open areas species such as Bluebell (*Hyacinthoides non-scripta*), Wood Anemone (*Anemone nemorosa*), Great Wood-rush (*Luzula sylvatica*), Ivy (*Hedera helix*) and Wood-sorrel (*Oxalis acetosella*) occur.

Further habitat diversity is created by the presence of streams within the woodland, and also by the presence of a small area with raised bog vegetation. Here bog mosses (*Sphagnum* spp.) and Heather (*Calluna vulgaris*), amongst other species, are found.

Three Red Data Book mammals occur in the site: Badger, Pine Marten and Hare. A large population of Common Frog breeds in the south-west of the site. This amphibian is also listed in the Red Data Book. Pheasant, Woodcock and Snipe are also present in the site.

The site is grazed by cattle, especially the northern sector. Parts of the wood clear-felled in recent years are showing fairly rapid natural regeneration.

Glenomra Wood is a good example of a deciduous semi-natural woodland and is of considerable conservation significance as it is of a type listed on Annex I of the E.U. Habitats Directive.

**Site Name: Tory Hill SAC****Site Code: 000439**

Tory Hill is an isolated, wooded limestone hill situated about 2 km north-east of Croom, Co. Limerick. It represents an important feature of the surrounding countryside and is a prime example of a limestone hill set amongst a region of volcanic intrusions of differing shape and geology. The hill is of geomorphological interest for the end-moraine, left by retreating ice, on its northern flanks and for ice-marks that are clearly visible on the solid rock. The site includes Lough Nagirra and its associated wetland vegetation, located to the north and north-east of Tory Hill.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[6210] Orchid-rich Calcareous Grassland\*

[7210] *Cladium* Fens\*

[7230] Alkaline Fens

Tory Hill supports areas of scrub and woodland, with Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*) comprising the main woody species found. The larger stands have a typical woodland flora. A well-developed limestone heath-scrub complex occurs on its western edge, which is very similar to the terrain found in the Burren region. This area is remarkable for its stand of Yew (*Taxus baccata*), a feature now rare in Ireland, and for its species-rich flora, which includes such calcium-loving plants as Fairy Flax (*Linum catharticum*), Quaking-grass (*Briza media*), Yellow Oat-grass (*Trisetum flavescens*) and Shining Crane's-bill (*Geranium lucidum*).

Areas of orchid-rich calcareous grassland are found on the eastern side of the hill and on its summit. A disused quarry also contains excellent examples of this grassland type. Four orchid species have been recorded here - Bee Orchid (*Ophrys apifera*), Pyramidal Orchid (*Anacamptis pyramidalis*), Early-purple Orchid (*Orchis mascula*) and Common Spotted-orchid (*Dactylorhiza fuchsii*). Other plant species of calcareous grassland present in this habitat include Carline Thistle (*Carlina vulgaris*), Yellow-wort (*Blackstonia perfoliata*), Wild Thyme (*Thymus praecox*), Crested Hair-grass (*Koeleria macrantha*), Downy Oat-grass (*Avenula pubescens*), Glaucous Sedge (*Carex flacca*), Hairy Rock-cress (*Arabis hirsuta*), Cowslip (*Primula veris*), Wild Carrot (*Daucus carota*), Red Fescue (*Festuca rubra*), Fairy Flax, Quaking-grass and Yellow Oat-grass, amongst others. The presence of the scarce Bee Orchid is of particular note.

Lough Nagirra has a thick fringe of Common Reed (*Phragmites australis*) and areas of alkaline fen and calcareous fen vegetation referable to the Caricion davallianae alliance with Great Fen-sedge (*Cladium mariscus*). Both of these fen types are listed on Annex I of the E.U. Habitats Directive, the latter with priority status.

A dense fringe of tall vegetation occurs around Lough Nagirra. Here, Great Fen-sedge (*Cladium mariscus*) is well-represented, along with Common Reed (*Phragmites australis*) and Reed Canary-grass (*Phalaris arundinacea*). The alkaline fen is relatively species-rich, with typical species including Black Bog-rush (*Schoenus nigricans*), Blunt-flowered Rush (*Juncus subnodulosus*), Brown Sedge (*Carex disticha*), Long-stalked Yellow-sedge (*C. lepidocarpa*), Common Sedge (*C. nigra*), Hairy Sedge (*C. hirta*), Glaucous Sedge (*C. flacca*), Carnation Sedge (*C. panicea*), Devil's-bit Scabious (*Succisa pratensis*), Early Marsh-orchid (*Dactylorhiza incarnata*) and Common Spotted-orchid (*D. fuchsii*), amongst others.

This site is of considerable conservation significance for the diversity of terrestrial and wetland habitats found within it, and particularly for the presence of good examples of three habitats that are listed on Annex I of the E.U. Habitats Directive.

**Site Name: Ratty River Cave SAC****Site Code: 002316**

This site lies approximately 2.5 km north of Sixmilebridge in Co. Clare. It consists of a cave, and also an important winter roost and a breeding site of the Lesser Horseshoe Bat.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[8310] Caves
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[1303] Lesser Horseshoe Bat ( <i>Rhinolophus hipposideros</i> )
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The cave in Ratty River Cave SAC is a natural fossil limestone cave set into the east-facing bank of Ratty River (also known as Owenogarney River). The cave entrance is overgrown with Bramble (*Rubus fruticosus* agg.). Inside the entrance there is a low crawl, but the cave opens into a main chamber before diverging into two tunnels. This cave has not been documented, but habitats present include rock roof and walls, and stalactites. The floor features are particularly notable because of their pristine condition. The cave is not known to flood.

Lesser Horseshoe Bats have been using the cave beside the Ratty River as a hibernation site for some years. During the winter of 2001, 187 bats were recorded here making it a site of international importance. A stretch of river and the bankside vegetation are included in the site as these are used by commuting bats. A derelict cottage which is situated nearby is also included as it contains a maternity roost of Lesser Horseshoe Bats. A total of 65 bats were recorded here in July 1998. The foraging areas used by these bats have yet to be established.

Neither roost is subject to disturbance and there are no other known threats to this site at present.

**Site Name: Askeaton Fen Complex SAC****Site Code: 002279**

Askeaton Fen Complex consists of a number of small fen areas to the east and south-east of Askeaton in Co. Limerick. This area has a number of undulating hills, some of which are quite steep, and is underlain by Lower Carboniferous Limestone. At the base of the hills a series of fens/reedbeds/loughs can be found, often in association with marl or peat deposits. At the south-east of Askeaton, both Cappagh and Ballymorisheen fens are surrounded by large cliff-like rocky limestone outcrops.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[7210] *Cladium* Fens\*  
[7230] Alkaline Fens

In Askeaton Fen Complex SAC a diversity of fen types are represented in a gradation from open water to drier seepage areas. One of the more important fen types, *Cladium* fen, which contains Great Fen-sedge (*Cladium mariscus*), occurs in various forms and is the most common fen type within the SAC. It is associated with wet conditions generally not >25 cm deep and can be found in mono-dominant stands growing on a marl base, such as at Feereagh and Mornane Loughs, and in the fen in the townland of Mornane. It can also be co-dominant with Common Reed (*Phragmites australis*) in slightly drier conditions, such as in Deegerty, Blind Lough and Dromlohan. It is also found in association with alkaline fen species such as Black Bog-rush (*Schoenus nigricans*) where it grows on a peaty substrate. *Cladium* fen is indicative of extremely base rich conditions. Typical species seen growing with the Great Fen-sedge include pondweeds (*Potamogeton* spp.), Marsh Horsetail (*Equisetum palustre*), Water Horsetail (*E. fluviatile*), Lesser Water-parsnip (*Berula erecta*), Lesser Marshwort (*Apium inundatum*), Bottle Sedge (*Carex rostrata*), particularly where marl is present, and Water Mint (*Mentha aquatica*). One such area of fen within the site is the only known location in Ireland for the water beetle *Hygrotus decoratus* and is also known to contain *Hydroporus scalesianus*, a rare water beetle indicative of undisturbed fens. At the edge of some of the Great Fen-sedge fens, particularly where improved grassland is not present, there is typically found a gradation to wet marsh, which in turn grades into wet grassland. These transition habitats add to the ecological diversity of the site.

Alkaline fen is characterised by the presence of Black Bog-rush in association with brown mosses and a small sedge community. The soil is permanently waterlogged but generally not flooded unless for a short period. Examples of this fen type are

found at the edge of almost all the sites, but its extent is much less than the Great Fen-sedge fen type within the SAC. The fen in the townlands of Moig West and Graigues is a good example of alkaline fen. Species seen growing with Black Bog-rush include Purple Moor-grass (*Molinia caerulea*), Long-stalked Yellow-sedge (*Carex lepidocarpa*), Carnation Sedge (*C. panicea*), rushes (*Juncus* spp.) and an abundance of brown mosses, including *Campylium stellatum*, *Ctenidium molluscum*, *Calliergon cuspidatum* and *Bryum pseudotriquetrum*. This fen type also grades into marsh and wet grassland.

Scrub and woodland is present on high ground in some areas, such as Ballymorisheen, Blind Lough, Ballyvogue, Dromlohan and Lough Feereagh. Species include Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Gorse (*Ulex europaeus*), Ash (*Fraxinus excelsior*), willow (*Salix* sp.), Downy Birch (*Betula pubescens*) and Hazel (*Corylus avellana*). This is a useful faunal habitat particularly as it is adjacent to reedbeds and fens.

A small area of limestone species-rich grassland is found to the north of Balinvirick fen. Species found which are typically associated with the habitat include the Early-purple Orchid (*Orchis mascula*), Carline Thistle (*Carlina vulgaris*) and Mountain Everlasting (*Antennaria dioica*).

Snipe use the tall marsh vegetation at the edge of the fens. Birds of prey such as Sparrowhawk feed over the reedbeds and scrubland areas of the site.

Land use in the area is quite intensive, with improved grassland extending down relatively steep slopes to the edge of the fens/loughs. New drainage or the deepening of existing drains poses a threat to the aquatic habitats at the site. In some instances, the fens appear to be drying out.

This site is of conservation value because it supports two fen types, each of which exhibit many sub-types. *Cladium* fen is listed as an Annex I priority habitat under the E.U. Habitats Directive. These wetland habitats of fen, reedbeds, open water, marsh and wet grassland are also valuable in that they supply a refuge for fauna in an otherwise intensively managed countryside.



**Site Name: Barrigone SAC****Site Code: 000432**

Barrigone is situated approximately 5 km west of Askeaton, Co. Limerick. The site comprises an area of dry, species-rich, calcareous grassland and patches of scrub on a gentle, north-east-facing slope. The underlying limestone outcrops occasionally, and the proximity of the site to the Shannon Estuary adds a maritime influence.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[5130] Juniper Scrub  
 [6210] Orchid-rich Calcareous Grassland\*  
 [8240] Limestone Pavement\*  
 [1065] Marsh Fritillary (*Euphydryas aurinia*)

The open calcareous grassland supports an impressive range of plant species. Cowslip (*Primula veris*), Mountain Everlasting (*Antennaria dioica*), Carline Thistle (*Carlina vulgaris*), Wild Thyme (*Thymus praecox*), Wood Sage (*Teucrium scorodonia*) and Violets (*Viola* spp.) are present, while Burnet Rose (*Rosa pimpinellifolia*) is abundant and scattered throughout the grassland. The maritime influence is evident through the presence in the sward of Sea Plantain (*Plantago maritima*). The orchid flora is particularly well-developed and diverse, with eight species recorded on recent visits. These include Fragrant Orchid (*Gymnadenia conopsea*), Frog Orchid (*Coeloglossum viride*), Butterfly Orchid (*Platanthera bifolia*), Pyramidal Orchid (*Anacamptis pyramidalis*) and the scarce Irish Orchid (*Neotinea maculata*).

A range of scrub types are present, including a dense stand of Hazel (*Corylus avellana*) towards the south, and a small area dominated by Juniper (*Juniperus communis*) in the north. Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*) and Gorse (*Ulex europaeus*) also form scrub patches, and these tend to be less species-rich.

Hairy Violet (*Viola hirta*), a species protected under the Flora (Protection) Order, 1999, occurs at Barrigone. The site also holds a large population of the Marsh Fritillary butterfly (*Euphydryas aurinia*), a species listed under Annex II of the E.U. Habitats Directive.

The primary threat to this site is quarrying. Grazing is also an important factor; over-grazing would cause damage to the vegetation, while under-grazing would allow scrub encroachment at the expense of grassland species which require more open

conditions. A balance between scrub and grassland is also important for invertebrate species.

A number of factors, including substrate, bedrock, microclimate and maritime influence, contribute to the floristic richness at Barrigone and hence to the ecological interest of this site. The presence of rare species of plant and invertebrate highlight the site's conservation value.

**Site Name: Curraghchase Woods SAC****Site Code: 000174**

This site is situated approximately 7 km east of Askeaton in Co. Limerick. The area is characterised by glacial drift deposits over Carboniferous limestone. The site consists largely of mixed woodland and a series of wetlands.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[91E0] Alluvial Forests\*  
 [91J0] Yew Woodlands\*  
 [1303] Lesser Horseshoe Bat (*Rhinolophus hipposideros*)

One of the main interests at the site is the presence of a hibernation site of the Lesser Horseshoe Bat. The bats hibernate in the cellars of the former mansion Curraghchase House. The entrance to the cellar is now grilled and all other access points blocked to prevent disturbance. In recent years bats have remained within the cellar throughout the year.

In winter 1995/96 more than 60 bats were recorded in the hibernation site, rating the site of international importance. It is considered that the number of bats will increase now that the site is protected from disturbance. This is the largest known site for this species in Co. Limerick.

The woodland consists of both deciduous species and stands of commercial conifers. Beech (*Fagus sylvatica*) is the most frequent deciduous species, but Pedunculate Oak (*Quercus robur*), Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*) and Hornbeam (*Carpinus betulus*) are also present. Spruce (*Picea* sp.) and Scots Pine (*Pinus sylvestris*) are the commonest conifers. Hazel (*Corylus avellana*) scrub and areas of wet woodland (*Salix* spp.) also occur.

The alluvial forest occurs in the southern part of the site and occupies low ground in a stream valley and some areas adjacent to a small lake. The dominant canopy species include Rusty Willow (*Salix cinerea* subsp. *oleifolia*), Alder (*Alnus glutinosa*), Downy Birch (*Betula pubescens*) and Ash. Exotics also occur, both conifer and broadleaved species, such as Beech and Horse-chestnut (*Aesculus hippocastanum*). A rich herb layer is found where the conifers are less dense, characterised by such species as Bugle (*Ajuga reptans*), Hemlock Water-dropwort (*Oenanthe crocata*), Yellow Iris (*Iris pseudacorus*), Meadowsweet (*Filipendula ulmaria*), Water-cress (*Nasturtium officinale*), Common Nettle (*Urtica dioica*) and Wood Sanicle (*Sanicula europaea*).

The Yew wood occurs as a stand on a limestone ridge above a stream valley. It is associated with an Oak-Ash wood, but also has a range of commercial planted species. Nevertheless, Yew is well represented and is readily regenerating. Other species present include Holly (*Ilex aquifolium*), Ash, Pedunculate Oak, Hazel and Hawthorn (*Crataegus monogyna*).

A series of small lakes and fens runs the length of the site. Some of these lakes are overgrown with vegetation. Black Bog-rush (*Schoenus nigricans*), Great Fen-sedge (*Cladium mariscus*), Greater Tussock-sedge (*Carex paniculata*), Carnation Sedge (*Carex panicea*) and Blunt-flowered Rush (*Juncus subnodulosus*) are some of the wetland species recorded. These wetlands, along with some wet grassland, add habitat diversity to the site.

The semi-natural habitats within the site provide ideal foraging habitat for the Lesser Horseshoe Bat. Further planting of conifer tree species at the expense of deciduous species should be avoided and attempts should be made to increase the area of deciduous woodland.

The combination of a secure hibernation site and suitable foraging habitat and the presence of over 60 individuals make Curraghchase Woods an internationally important site for the Lesser Horseshoe Bat. The presence of two woodland types that are listed with priority status on Annex I of the E.U. Habitats Directive, and especially Yew woodland, which is of very limited occurrence in Ireland, is of particular note.

## SITE SYNOPSIS

**SITE NAME: LOUGH DERG (SHANNON) SPA**

**SITE CODE: 004058**

Lough Derg lies within counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes, being some 40 km long. Its maximum breadth across the Scarriff Bay -Youghal Bay transect is 13 km but for most of its length it is less than 5 km wide. The lake is relatively shallow at the northern end being mostly 6 m in depth but in the middle region it has an axial trench and descends to over 25 m in places. The narrow southern end of the lake has the greatest average depth, with a maximum of 34 m. The greater part of the lake lies on Carboniferous limestone but the narrow southern section is underlain by Silurian strata. Most of the lower part of the lake is enclosed by hills on both sides, the Slieve Aughty Mountains to the west and the Arra Mountains to the east. The northern end is bordered by relatively flat, agricultural country. The lake shows the high hardness levels and alkaline pH to be expected from its mainly limestone catchment basin, and it has most recently been classified as a mesotrophic system. The lake has many small islands, especially on its western and northern sides. The shoreline is often fringed with swamp vegetation. Aquatic vegetation includes a range of charophyte species, including the Red Data Book species, *Chara tomentosa*. The shoreline is often fringed by swamp vegetation, comprised of such species as Common Reed (*Phragmites australis*), Great Fen-sedge (*Cladium mariscus*) and Bottle Sedge (*Carex rostrata*).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Tufted Duck, Goldeneye and Common Tern. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Lough Derg is of importance for both breeding and wintering birds. The site supports a nationally important breeding colony of Common Tern (55 pairs recorded in 1995). Management of one of the islands used for nesting has increased the area of suitable habitat available and prevented nests being destroyed by fluctuating water levels. Large numbers of Black-headed Gull have traditionally bred on the many islands (2,176 pairs in 1985) but the recent status of this species is not known. The islands in the lake also support a nationally important Cormorant colony - 167 pairs were recorded in 1995; a partial survey of the lake in 2010 recorded 113 pairs. Lough Derg is also a noted breeding site for Great Crested Grebe (47 pairs in 1995) and Tufted Duck (169 pairs in May 1995).

In winter, the lake is important for a range of waterfowl species, including nationally important populations of Tufted Duck (776) and Goldeneye (157) – all figures are mean peaks for 4 of the 5 seasons between 1995/96 and 1999/2000. Other species which occur in winter include Mute Swan (164), Whooper Swan (18), Wigeon (249), Teal (301), Mallard (376), Little Grebe (14), Cormorant (90), Coot (173), Lapwing

(922), Curlew (66) and Black-headed Gull (732). Areas to north and south west of Lough Derg have been utilised in the past by small numbers of Greenland White-fronted Goose – 19 geese were recorded on callowland near Portumna in 1996/97. A relatively small flock based in the Lough Derg-Lough Graney area and possibly further afield have been recorded in the Scarriff Bay area – 20 geese recorded in 2004. Few sightings, at either location have been made in recent years.

Hen Harrier are also known to roost in the reedbeds on the margins of the site during the winter.

Lough Derg (Shannon) SPA is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it has nationally important populations of Tufted Duck and Goldeneye, as well as a range of other species including Whooper Swan. The presence of Whooper Swan, Greenland White-fronted Goose, Hen Harrier and Common Tern is of particular note as these are listed on Annex I of the E.U. Birds Directive. Parts of Lough Derg (Shannon) SPA are a Wildfowl Sanctuary.

## SITE SYNOPSIS

**SITE NAME: RIVER SHANNON AND RIVER FERGUS ESTUARIES SPA**

**SITE CODE: 004077**

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry.

The site has vast expanses of intertidal flats which contain a diverse macro-invertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (57,133 - five year mean for the period 1995/96 to 1999/2000), a concentration easily of international importance. The site has internationally important populations of Light-bellied Brent Goose (494), Dunlin (15,131), Black-tailed Godwit (2,035) and Redshank (2,645). A further 17 species have populations of national importance, i.e. Cormorant (245), Whooper Swan (118), Shelduck (1,025), Wigeon (3,761), Teal (2,260), Pintail (62), Shoveler (107), Scaup (102), Ringed Plover (223), Golden Plover (5,664), Grey Plover (558), Lapwing (15,126), Knot (2,015), Bar-tailed Godwit (460), Curlew (2,396), Greenshank (61) and Black-headed Gull (2,681) - figures are five year mean peak counts for the period 1995/96 to 1999/2000. The site is among the most important in the country for several of these species, notably Dunlin (13 % of national total), Lapwing (6% of national total) and Redshank (9% of national total).

The site also supports a nationally important breeding population of Cormorant (93 pairs in 2010).

Other species that occur include Mute Swan (103), Mallard (441), Red-breasted Merganser (20), Great Crested Grebe (50), Grey Heron (38), Oystercatcher (551),

Turnstone (124) and Common Gull (445) - figures are five year mean peak counts for the period 1995/96 to 1999/2000.

Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn.

The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.



30.5.2015

## SITE SYNOPSIS

**SITE NAME: STACK'S TO MULLAGHAREIRK MOUNTAINS, WEST LIMERICK HILLS AND MOUNT EAGLE SPA**

**SITE CODE: 004161**

The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The site is skirted by the towns of Newcastle West, Ballydesmond, Castleisland, Tralee and Abbeyfeale. The mountain peaks included in the site are not notably high or indeed pronounced, the highest being at Knockfeha (451 m). Other mountains included are Mount Eagle, Knockanefune, Garraunbaun, Taur, Rock Hill, Knockacummer, Mullaghmuish, Knight's Mt, Ballincollig Hill, Beennageeha Mt, Sugar Hill, Knockanimpuba and Knockathea, amongst others. Many rivers rise within the site, notably the Blackwater, Owentaraglin, Owenkeal, Glenlara, Feale, Clydagh, Allaghaun, Allow, Oolagh, Galey and Smerlagh.

The site consists of a variety of upland habitats, though almost half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*). A substantial part (28%) of the site is unplanted blanket bog and heath, with both wet and dry heath present. The vegetation of these habitats is characterised by such species as Ling Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Common Cottongrass (*Eriophorum angustifolium*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Deergrass (*Scirpus cespitosus*) and Purple Moor-grass (*Molinia caerulea*). The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Hen Harrier.

This SPA is a stronghold for Hen Harrier and supports the largest concentration of the species in the country. A survey in 2005 recorded 45 pairs, which represents over 20% of the all-Ireland total. A similar number of pairs had been recorded in the 1998-2000 period. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the E.U. Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to c. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey.

Short-eared Owl, a very rare species in Ireland, has been known to breed within the site. Nesting certainly occurred in the late 1970s and birds have been recorded intermittently since. The owls are considered to favour this site due to the presence of Bank Voles, a favoured prey item. Merlin also breed within the site but the size of the population is not known. Red Grouse is found on some of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed.

The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is of ornithological importance because it provides excellent nesting and foraging habitat for breeding Hen Harrier and is one the top sites in the country for the species. The presence of three species, Hen Harrier, Merlin and Short-eared Owl, which are listed on Annex I of the E.U. Birds Directive is of note.

# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A2: European Site Conservation Objectives**



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## Conservation objectives for Slievefelim to Silvermines Mountains SPA [004165]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	Common Name	Scientific Name
A082	Hen Harrier	<i>Circus cyaneus</i>



**Citation:** NPWS (2018) *Conservation objectives for Slievefelim to Silvermines Mountains SPA [004165]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*

# National Parks and Wildlife Service

## Conservation Objectives Series

### Lower River Shannon SAC 002165



**An Roinn**  
**Ealaíon, Oidhreachta agus Gaeltachta**  
**Department of**  
**Arts, Heritage and the Gaeltacht**





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**Citation:**

NPWS (2012) Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

**Series Editors: Rebecca Jeffrey & Naomi Kingston  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

### 002165 Lower River Shannon SAC

1029	Freshwater Pearl Mussel <i>Margaritifera margaritifera</i>
1095	Sea Lamprey <i>Petromyzon marinus</i>
1096	Brook Lamprey <i>Lampetra planeri</i>
1099	River Lamprey <i>Lampetra fluviatilis</i>
1106	Atlantic Salmon <i>Salmo salar</i> (only in fresh water)
1110	Sandbanks which are slightly covered by sea water all the time
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1150	*Coastal lagoons
1160	Large shallow inlets and bays
1170	Reefs
1220	Perennial vegetation of stony banks
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts
1310	<i>Salicornia</i> and other annuals colonizing mud and sand
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )
1349	Bottlenose Dolphin <i>Tursiops truncatus</i>
1355	Otter <i>Lutra lutra</i>
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )
91E0	*Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )

**Please note that this SAC overlaps with River Shannon and River Fergus Estuaries SPA (004077), Loop Head SPA (004119), Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161), Slievefelim to Silvermines Mountains SPA (004165) and Kerry Head SPA (004189). It is also adjacent to Clare Glen SAC (00930). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.**

## Supporting documents, relevant reports & publications (listed by date)

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

<b>Title:</b>	Aspects of brook lamprey ( <i>Lampetra planeri</i> Bloch) spawning in Irish waters
<b>Year:</b>	in press
<b>Author:</b>	Rooney, S.M.; O’Gorman, N.M.; Green, F.; King, J.J.
<b>Series:</b>	Biology and Environment
<b>Title:</b>	Lower River Shannon SAC (002170): Conservation objectives supporting document - Coastal lagoons [Version 1]
<b>Year:</b>	2012
<b>Author:</b>	NPWS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Lower River Shannon SAC (002170): Conservation objectives supporting document - Marine habitats and species [Version 1]
<b>Year:</b>	2012
<b>Author:</b>	NPWS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Lower River Shannon SAC (002170): Conservation objectives supporting document - Coastal habitats [Version 1]
<b>Year:</b>	2012
<b>Author:</b>	NPWS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Lower River Shannon SAC (002170): Conservation objectives supporting document - Woodland habitats [Version 1]
<b>Year:</b>	2012
<b>Author:</b>	NPWS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Lower River Shannon SAC (002170): Conservation objectives supporting document - Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [Version 1]
<b>Year:</b>	2012
<b>Author:</b>	NPWS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Intertidal Hard and Soft Bottom Investigations in Lower River Shannon cSAC (Site Code: IE002165)/Shannon Fergus Estuary SPA (Site Code: IE004077)
<b>Year:</b>	2011c
<b>Author:</b>	Aquafact
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Reef Investigations in Lower River Shannon cSAC (cSAC Site Code: IE002165)
<b>Year:</b>	2011b
<b>Author:</b>	Aquafact
<b>Series:</b>	Unpublished Report to NPWS

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- Title:** Subtidal Benthic Investigations in Lower River Shannon cSAC (cSAC Site Code: IE002165)  
**Year:** 2011a  
**Author:** Aquafact  
**Series:** Unpublished Report to NPWS
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- Title:** National survey and assessment of the conservation status of Irish sea cliffs  
**Year:** 2011  
**Author:** Barron, S.J.; Delaney, A.; Perrin, P.M.; Martin, J.; O'Neill, F.  
**Series:** Irish Wildlife Manuals No. 53
- 
- Title:** Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland  
**Year:** 2011  
**Author:** Gargan, P. G.; Roche, W. K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.  
**Series:** J. Appl. Ichthyol. 27 (Suppl. 3), 66–72
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- Title:** Fine-scale population genetic structuring of bottlenose dolphins in Irish coastal waters  
**Year:** 2011  
**Author:** Mirimin, L.; Miller, R.; Dillane, E.; Berrow, S.D.; Ingram, S.; Cross, T.F.; Rogan, E.  
**Series:** Animal Conservation 2011: 1–12
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- Title:** The use of Cork Harbour by bottlenose dolphins (*Tursiops truncatus* (Montagu, 1821))  
**Year:** 2011  
**Author:** Ryan, C.; Cross, T.F.; Rogan, E.  
**Series:** Irish Naturalists' Journal 31(1): 1-9
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- Title:** Irish cetacean review (2000-2009)  
**Year:** 2010  
**Author:** Berrow, S.D.; Whooley, P.; O'Connell, M.; Wall, D.  
**Series:** Irish Whale and Dolphin Group
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- Title:** Bottlenose Dolphin SAC Survey 2010  
**Year:** 2010  
**Author:** Berrow, S.D.; O'Brien, J.; Groth, L.; Foley, A.; Voigt, K.  
**Series:** Unpublished Report to NPWS
- 
- Title:** Otter tracking study of Roaringwater Bay  
**Year:** 2010  
**Author:** De Jongh, A.; O'Neill, L.  
**Series:** Unpublished Draft Report to NPWS
- 
- Title:** Second Draft Cloon (Shannon Estuary) Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015)  
**Year:** 2010  
**Author:** DEHLG  
**Series:** Unpublished Report to NPWS
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- Title:** Social structure within the bottlenose dolphin (*Tursiops truncatus*) population in the Shannon Estuary, Ireland
- Year:** 2010
- Author:** Foley, A.; McGrath, D.; Berrow, S.D.; Gerritsen, H.
- Series:** Aquatic Mammals 36(4): 372-381
- 
- Title:** Irish Semi-natural Grasslands Survey. Annual report no. 3: Counties Donegal, Dublin, Kildare & Sligo
- Year:** 2010
- Author:** O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; McNutt, K.E.; Perrin, P.M.; Delaney, A.
- Series:** Unpublished Report to NPWS
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- Title:** A provisional inventory of ancient and long-established woodland in Ireland
- Year:** 2010
- Author:** Perrin, P.M.; Daly, O.H.
- Series:** Irish Wildlife Manuals No. 46
- 
- Title:** Monitoring and Assessment of Irish Lagoons for the purpose of the EU Water Framework Directive
- Year:** 2010
- Author:** Roden, C.M.; Oliver, G.
- Series:** EPA
- 
- Title:** Report of the standing scientific committee to the DCENR. The status of Irish salmon stocks in 2010 and precautionary catch advice for 2011
- Year:** 2010
- Author:** SSC
- Series:** Unpublished Report to DCENR
- 
- Title:** The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. [S.I. 296 of 2009]
- Year:** 2009b
- Author:** Government of Ireland
- Series:** Irish Statute Book
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- Title:** The European Communities Environmental Objectives (Surface Water) Regulations 2009. [S.I. 272 of 2009]
- Year:** 2009a
- Author:** Government of Ireland
- Series:** Irish Statute Book
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- Title:** Winter distribution of bottle-nosed dolphins (*Tursiops truncatus* (Montagu)) in the inner Shannon Estuary
- Year:** 2009
- Author:** Berrow, S.D.
- Series:** Irish Naturalists' Journal 30(1): 35-39
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- Title:** Towards a bottlenose dolphin whistle ethogram from the Shannon Estuary, Ireland
- Year:** 2009
- Author:** Hickey, R.; Berrow, S.D.; Goold, J.
- Series:** Biology and Environment: Proceedings of the Royal Irish Academy 109B (2), 89–94
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- Title:** Saltmarsh Monitoring Report 2007-2008  
**Year:** 2009  
**Author:** McCorry, M.; Ryle, T.  
**Series:** Unpublished Report to NPWS
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- Title:** Cetaceans in Irish waters: A review of recent research  
**Year:** 2009  
**Author:** O'Brien, J.; Berrow, S.D.; McGrath, D.; Evans, P.G.H.  
**Series:** Biology and Environment: Proceedings of the Royal Irish Academy 109B (2): 63-88
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- Title:** A note on long-distance matches of bottlenose dolphins (*Tursiops truncatus*) around the Irish coast using photoidentification  
**Year:** 2009  
**Author:** O'Brien, J.; Berrow, S.D.; Ryan, C.; McGrath, D.; O'Connor, I.; Pesante, G.; Burrows, G.; Massett, N.; Klotzer, V.; Whooley, P.  
**Series:** Journal Cetacean Res. Mgmt. 11: 69–74
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- Title:** An updated population status report for bottlenose dolphins using the Lower River Shannon SAC in 2008  
**Year:** 2008  
**Author:** Englund, A.; Ingram, S.; Rogan, E.  
**Series:** Unpublished Report to NPWS
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- Title:** National Survey of Native Woodlands 2003-2008  
**Year:** 2008  
**Author:** Perrin, P.; Martin, J.; Barron, S.; O'Neill, F.; McNutt, K.; Delaney, A.  
**Series:** Unpublished Report to NPWS
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- Title:** Rapid Assessment of *Margaritifera margaritifera* (L.) populations in Ireland: Rivers assessed in 2007  
**Year:** 2008  
**Author:** Ross, E.D.  
**Series:** Unpublished Report to NPWS
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- Title:** Marine surveys of two Irish sandbank cSACs  
**Year:** 2007  
**Author:** Aquafact  
**Series:** Unpublished Report to NPWS
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- Title:** Population status report for bottlenose dolphins using the Lower River Shannon SAC, 2006-2007  
**Year:** 2007  
**Author:** Englund, A.; Ingram, S.; Rogan, E.  
**Series:** Unpublished Report to NPWS
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- Title:** Evolutionary history of lamprey paired species *Lampetra fluviatilis* (L.) and *Lampetra planeri* (Bloch) as inferred from mitochondrial DNA variation  
**Year:** 2007  
**Author:** Espanhol, R.; Almeida, P.R.; Alves, M.J.  
**Series:** Molecular Ecology 16, 1909-1924
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**Title:** Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents, Article 17 forms and supporting maps

**Year:** 2007

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** A Survey of Juvenile Lamprey Populations in the Corrib and Suir Catchments

**Year:** 2007

**Author:** O'Connor, W.

**Series:** Irish Wildlife Manuals No. 26

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**Title:** Inventory of Irish coastal lagoons

**Year:** 2007

**Author:** Oliver, G.

**Series:** Unpublished Report to NPWS

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**Title:** Using T-PODs to investigate the echolocation of coastal bottlenose dolphins

**Year:** 2007

**Author:** Philpott, E.; Englund, A.; Ingram, S.; Rogan, E.

**Series:** Journal of Marine Biological Association, UK. 87: 11-17

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**Title:** Otter Survey of Ireland 2004/2005

**Year:** 2006

**Author:** Bailey, M.; Rochford, J.

**Series:** Irish Wildlife Manuals No. 23

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**Title:** Whistle Production by Bottlenose Dolphins *Tursiops truncatus* in the Shannon Estuary

**Year:** 2006

**Author:** Berrow, S.D.; O'Brien, J.; Holmes, B.

**Series:** Irish Naturalists' Journal. 28(5): 208-213

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**Title:** The status of host fish populations and fish species richness in European freshwater pearl mussel (*Margaritifera margaritifera*) streams

**Year:** 2006

**Author:** Geist, J.; Porkka, M.; Kuehn, R.

**Series:** Aquatic Conservation: Marine and Freshwater Ecosystems 16, 251–266

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**Title:** Otters - ecology, behaviour and conservation

**Year:** 2006

**Author:** Kruuk, H.

**Series:** Oxford University Press

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**Title:** A survey of rare and scarce vascular plants in County Limerick

**Year:** 2006

**Author:** Reynolds, S.; Conaghan, J.; Fuller, J.

**Series:** Unpublished Report to NPWS

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- Title:** National Inventory of sea cliffs and coastal heaths  
**Year:** 2005  
**Author:** Browne, A.  
**Series:** Unpublished Report to NPWS
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- Title:** Developing sustainable whalewatching in the Shannon estuary  
**Year:** 2003  
**Author:** Berrow, S.D.  
**Series:** p198-203; In Marine Ecotourism: Issues and Experiences. Garrod, B and Wilson. J. (Eds.) Channel View Publications
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- Title:** Identifying lamprey. A field key for sea, river and brook lamprey  
**Year:** 2003  
**Author:** Gardiner, R.  
**Series:** Conserving Natura 2000 rivers, Conservation techniques No. 4. English Nature, Peterborough
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- Title:** Monitoring the river, sea and brook lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*  
**Year:** 2003  
**Author:** Harvey, J.; Cowx, I.  
**Series:** Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
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- Title:** Bottlenose dolphins (*Tursiops truncatus*) in the Shannon Estuary and selected areas of the west-coast of Ireland  
**Year:** 2003  
**Author:** Ingram, S.; Rogan, E.  
**Series:** Unpublished Report to NPWS
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- Title:** The ecology of seabirds and marine mammals in a fluctuating marine environment  
**Year:** 2003  
**Author:** Rogan, E.; Kelly, T.; Ingram, S.; Roycroft, D.  
**Series:** Unpublished Report to Higher Education Authority of Ireland
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- Title:** Irish Whale and Dolphin Group cetacean sighting review (1991-2001)  
**Year:** 2002  
**Author:** Berrow, S.D.; Whooley, P.; Ferriss, S.  
**Series:** Irish Whale and Dolphin Group
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- Title:** Organochlorine concentrations in resident bottlenose dolphins (*Tursiops truncatus*) in the Shannon estuary, Ireland  
**Year:** 2002  
**Author:** Berrow, S.D.; McHugh, B.; Glynn, D.; McGovern, E.; Parsons, K.; Baird, R.W.; Hooker, S.D.  
**Series:** Marine Pollution Bulletin 44: 1296-1313
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- Title:** Identifying critical areas and habitat preferences of bottlenose dolphins (*Tursiops truncatus*)  
**Year:** 2002  
**Author:** Ingram, S.; Rogan, E.  
**Series:** Marine Ecology Progress Series 244: 247-255
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- Title:** Reversing the habitat fragmentation of British woodlands  
**Year:** 2002  
**Author:** Peterken, G.  
**Series:** WWF-UK, London
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- Title:** An extensive survey of bottlenose dolphins (*Tursiops truncatus*) on the west coast of Ireland  
**Year:** 2001  
**Author:** Ingram, S.; Englund, A.; Rogan, E.  
**Series:** Unpublished Report to the Heritage Council
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- Title:** The ecology and conservation of bottlenose dolphins in the Shannon Estuary, Ireland  
**Year:** 2000  
**Author:** Ingram, S.  
**Series:** Unpublished PhD thesis, University College Cork
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- Title:** A survey of bottlenose dolphins (*Tursiops truncatus*) in the Shannon Estuary  
**Year:** 2000  
**Author:** Rogan, E.; Ingram, S.; Holmes, B.; O'Flanagan, C.  
**Series:** Marine Institute Marine Resource Series No. 9
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- Title:** Tour boats and dolphins: A note on quantifying the activities of whale watching boats in the Shannon estuary, Ireland  
**Year:** 1999  
**Author:** Berrow, S.D.; Holmes, B.  
**Series:** Journal of Cetacean Research and Management 1(2): 199-200
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- Title:** Diet of Otters *Lutra lutra* on Inishmore, Aran Islands, west coast of Ireland  
**Year:** 1999  
**Author:** Kingston, S.; O'Connell, M.; Fairley, J.S.  
**Series:** Biol & Environ Proc R Ir Acad B 99B:173-182
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- Title:** National Shingle Beach Survey of Ireland 1999  
**Year:** 1999  
**Author:** Moore, D.; Wilson, F.  
**Series:** Unpublished Report to NPWS
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- Title:** The saltmarshes of Ireland: an inventory and account of their geographical variation  
**Year:** 1998  
**Author:** Curtis, T.G.F.; Sheehy-Skeffington, M.J.  
**Series:** Biology and Environment, Proceedings of the Royal Irish Academy 98B: 87-104
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- Title:** A survey of intertidal sediment biotopes in estuaries in Ireland  
**Year:** 1997  
**Author:** Falvey, J.P.; Costello, M.J.; Dempsey, S.  
**Series:** Unpublished Report
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**Title:** Distribution and Abundance of Bottle-nosed Dolphins *Tursiops truncatus* (Montagu) in the Shannon Estuary, Ireland

**Year:** 1996

**Author:** Berrow, S.D.; Holmes, B.; Kiely, O.

**Series:** Biology and Environment: Proceedings of the Royal Irish Academy 96B (1), 1-9

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**Title:** The spatial organization of otters (*Lutra lutra*) in Shetland

**Year:** 1991

**Author:** Kruuk, H.; Moorhouse, A.

**Series:** J. Zool, 224: 41-57

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**Title:** Otter survey of Ireland

**Year:** 1982

**Author:** Chapman, P.J.; Chapman, L.L.

**Series:** Unpublished Report to Vincent Wildlife Trust

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## Spatial data sources

<b>Year:</b>	Interpolated 2012
<b>Title:</b>	Sandbank Survey 2007
<b>GIS operations:</b>	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1110 (map 3)
<b>Year:</b>	Interpolated 2012
<b>Title:</b>	Sandbank survey 2007; subtidal benthic survey 2010; reef survey 2010; intertidal hard and soft bottom survey 2010
<b>GIS operations:</b>	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	Marine community types, 1110, 1140, 1170 (maps 3, 5, 8, 9)
<b>Year:</b>	2010
<b>Title:</b>	EPA WFD transitional waterbody data
<b>GIS operations:</b>	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1130 (map 4)
<b>Year:</b>	Revision 2011
<b>Title:</b>	Inventory of Irish Coastal Lagoons. Version 3
<b>GIS operations:</b>	Clipped to SAC boundary
<b>Used for:</b>	1150 (map 6)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. EPA WFD transitional waterbody data erased from extent. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1160 (map 7)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
<b>Used for:</b>	Marine community types base data (map 9)
<b>Year:</b>	Revision 2012
<b>Title:</b>	National Shingle Beach Survey
<b>GIS operations:</b>	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1220 (map 10)
<b>Year:</b>	2011
<b>Title:</b>	National Survey and assessment of the conservation status of Irish sea cliffs
<b>GIS operations:</b>	Clipped to SAC boundary
<b>Used for:</b>	1230 (map 11)

<b>Year:</b>	Revision 2010
<b>Title:</b>	Saltmarsh Monitoring Project 2007-2008. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary; overlapping regions with Coastal CO data investigated and resolved with expert opinion used
<b>Used for:</b>	1310, 1330, 1410 (map 12)
<b>Year:</b>	Derived 2012
<b>Title:</b>	Internal NPWS files
<b>GIS operations:</b>	Dataset created from spatial references supplied by NPWS experts. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	3260 (map 13)
<b>Year:</b>	Revision 2010
<b>Title:</b>	National Survey of Native Woodlands 2003-2008. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	91E0 (map 14)
<b>Year:</b>	2012
<b>Title:</b>	NPWS rare and threatened species database
<b>GIS operations:</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1029 (map 15)
<b>Year:</b>	Revision 2012
<b>Title:</b>	Margaritifera Sensitive Areas data
<b>GIS operations:</b>	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1029 (map 15)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	Low Water Mark (LWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1349 (map 16)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	Creation of an 80m buffer on the marine side of the high water mark (HWM); creation of a 10m buffer on the terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on the terrestrial side of the river banks data; creation of 20m buffer applied to canal centreline data. These datasets are combined with the derived EPA WFD Waterbodies data and Coastal Lagoon data for the 1355 CO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising. Creation of 250m buffer on marine side of HWM to highlight potential commuting points
<b>Used for:</b>	1355 (map 17)

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<b>Year:</b>	2010
<b>Title:</b>	EPA WFD Waterbodies data
<b>GIS operations:</b>	Creation of a 20m buffer applied to river and stream centreline data; creation of 80m buffer on the aquatic side of lake data; creation of 10m buffer on the terrestrial side of lake data. These datasets are combined with the derived OSi data and Coastal Lagoon data for the 1355 CO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1355 (no map)

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<b>Year:</b>	Revision 2011
<b>Title:</b>	Inventory of Irish Coastal Lagoons. Version 3
<b>GIS operations:</b>	Creation of 80m buffer on the aquatic side of lagoon data; creation of 10m buffer on the terrestrial side of lagoon data. These datasets are combined with the derived OSi data and EPA WFD Waterbodies data for the 1355 CO. Overlapping regions are investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1355 (no map)

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### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 7km. See map 15	This conservation objective applies to the freshwater pearl mussel population in the Cloon River, Co. Clare only (see also the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (Government of Ireland, 2009b)). The Cloon population is confined to the main channel and is distributed from Croany Bridge to approx. 1.5km upstream of Clonderalaw Bridge (Ross, 2008; DEHLG, 2010)
Population size	Number of adult mussels	Restore to 10,000 adult mussels	The Cloon population was estimated as less than 10,000 in 2009 (DEHLG, 2010)
Population structure: recruitment	Percentage per size class	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. No juvenile or young mussels were found in the Cloon in 2007, with the smallest mussel measuring 80.3mm (Ross, 2008). A single 'young mussel' measuring 61.3mm was recorded in 2009 (DEHLG, 2010)
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. The Cloon failed the target for dead shells in 2009, with 31% dead shells across the single transect counted. There were no previous data on the number of live adults (DEHLG, 2010)

## Conservation objectives for: Lower River Shannon SAC [002165]

### 1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat extent	Kilometres	Restore suitable habitat in more than 3.3km (see map 15) and any additional stretches necessary for salmonid spawning	The species' habitat covers stretches of a short coastal river; and is a combination of 1) the area of habitat adult and juvenile mussels can occupy and 2) the area of spawning and nursery habitats the host fish can occupy. Fish nursery habitat typically overlaps with mussel habitat. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only those salmonid spawning areas that could regularly contribute juvenile fish to the areas occupied by adult mussels should be considered. The availability of mussel habitat and fish spawning and nursery habitats are determined by flow and substratum conditions. The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles (DEHLG, 2010). The target is based on the stretches of river identified, from a combination of dedicated survey and incidental records, as having habitat for the species
Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality-macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	These EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). The habitat in the Cloon failed both standards during 2009 sampling for the Sub-basin Management Plans (DEHLG, 2010). See also The European Communities Environmental Objectives (Surface Water) Regulations 2009 (Government of Ireland, 2009a)
Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Percentage	Restore substratum quality-filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%)	The habitat in the Cloon failed both standards during 2009 sampling for the Sub-basin Management Plans, with cover abundance values of up to 50% recorded for filamentous algae and 80% for macrophytes (DEHLG, 2010). Recruitment of juvenile mussels is being prevented by the poor quality of the river substrata



### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Substratum quality: sediment	Occurrence	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The habitat for the species is currently unsuitable for the recruitment of juveniles owing to sedimentation of the substratum. In many locations, it is also unsuitable for the survival of adult mussels (DEHLG, 2010). Significant sedimentation has been recorded during all recent mussel monitoring surveys (Ross, 2008; DEHLG, 2010). Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Redox potential measurements in 2009 yielded losses of 32.3 - 43.5% (average of 39%) at 5cm depth (DEHLG, 2010)
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other important factor). In order to restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum, 2) low flows do not exacerbate the deposition of fines and 3) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval form of the freshwater pearl mussel and, thus, they are essential to the completion of the life cycle. 0+ and 1+ fish are typically used, both because of the habitat overlaps and the development of immunity with age in the fish. Fish presence is considered sufficient, as higher densities and biomass of fish are indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for pearl mussels and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. Fish movement patterns must be such that 0+ fish in the vicinity of the mussel habitat remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. The Cloon freshwater pearl mussel population appears to favour native brown trout, with 17.2% of 1+ and older trout caught in 2009 hosting glochidia (DEHLG, 2010). Therefore, it is particularly important that trout are not out-competed by stocked fish

**Conservation objectives for: Lower River Shannon SAC [002165]****1095 Sea Lamprey *Petromyzon marinus***

To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. See Gargan et al. (2011). Specific barriers serve to constrain the up-river migration of sea lamprey. The upper extent of the SAC in the R. Fergus is delineated by a barrier to migration. Barriers are also present in the Mulkear and Feale
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007)
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Lampreys spawn in clean gravels. Surveys by Inland Fisheries Ireland (IFI) commonly indicated accumulations of redds downstream of major weirs. (See also Gargan et al., 2011)
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Despite observed spawning activity, sampling for ammocoetes consistently fails to find these in many sampling stations and never in any great numbers

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1096 Brook Lamprey *Lampetra planeri*

To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to brook lampreys' migration, both up- and downstream, thereby possibly limiting the species to specific stretches and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Spawning site and redd attributes established by IFI (Rooney et al., in press)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability, or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King et al., unpublished data)

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1099 River Lamprey *Lampetra fluviatilis*

To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to river lampreys' migration, both up- and downstream, thereby possibly limiting species to specific stretches and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of river/brook lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability, or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King et al., unpublished data)

**Conservation objectives for: Lower River Shannon SAC [002165]**

**1106 Atlantic Salmon *Salmo salar* (only in fresh water)**

To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. The large hydro-electric station at Ardnacrusha and the Parteen regulating weir present considerable obstructions to upstream passage of salmon on the Shannon main channel. While both have fish passes installed, upstream migration of salmon is still problematical. Further weirs upstream on the Shannon also restrict access to spawning habitat. No such obstacles, causing significant fish passage issues for salmon are present on the Feale and Mulkear rivers
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2010). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The salmon stocks in the Shannon above the impoundments are significantly below their Conservation Limits. Salmon stocks in the Feale and Mulkear rivers are above CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL). The abundance of salmon fry at monitored sites on the Shannon main channel, above the hydro-electric station, is significantly below this target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice ( <i>Lepeophtheirus salmonis</i> ). On the Shannon main channel, salmon smolt abundance may be significantly affected by mortality passing through hydro-electric turbines
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat on the Shannon main channel

**Conservation objectives for: Lower River Shannon SAC [002165]****1106 Atlantic Salmon *Salmo salar* (only in fresh water)**

To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1110 Sandbanks which are slightly covered by sea water all the time

To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	The distribution of sandbanks is stable, subject to natural processes. See map 3	Distribution established using the Valentia Island to River Shannon Admiralty Chart (no. 1819_0)
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated as 1,353ha using the Valentia Island to River Shannon Admiralty Chart (no. 1819_0)
Community distribution	Hectares	Conserve the following community type in a natural condition: Subtidal sand to mixed sediment with <i>Nephtys</i> spp. community complex. See map 9	The likely area of the community was derived from a sandbank survey in 2007 (Aquafact, 2007) and a subtidal survey in 2010 (Aquafact, 2011a). See marine supporting document for further details



## Conservation objectives for: Lower River Shannon SAC [002165]

### 1130 Estuaries

To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area was estimated as 24,273ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal muddy sand to mixed sediment with gammarids community complex; Subtidal sand to mixed sediment with <i>Nucula nucleus</i> community complex; Subtidal sand to mixed sediment with <i>Nephtys</i> spp. community complex; Furoid-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; and Anemone-dominated subtidal reef community. See map 9	The likely area of these communities was derived from intertidal and subtidal surveys undertaken in 2010 (Aquafact, 2011a and c). See marine supporting document for further details

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 5	Habitat area was estimated using OSi data as 8,808ha
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand with <i>Scolecipis squamata</i> and <i>Pontocrates</i> spp. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex. See map 9	The likely area of these communities was derived from an intertidal survey in 2010 (Aquafact, 2011c). See marine supporting document for further details

**Conservation objectives for: Lower River Shannon SAC [002165]**

**1150 \*Coastal lagoons**

**To restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	Area stable or increasing, subject to natural processes. Favourable reference area 33.4ha- Shannon Airport Lagoon 24.2ha; Clooncneen Pool 3.9ha; Scatterry Lagoon 2.8ha; Quayfield and Poulaweala Loughs 2.5ha. See map 6	Areas calculated from spatial data derived from Oliver, 2007. Site codes IL031- IL034. See lagoon supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 6	Sites IL031-IL034 in Oliver, 2007. See lagoon supporting document for further details
Salinity regime	practical salinity units (psu)	Median annual salinity and temporal variation within natural ranges	The lagoons in the site vary from oligohaline to euhaline. See lagoon supporting document for further details
Hydrological regime	Metres	Annual water level fluctuations and minima within natural ranges	Lagoons listed for this site are all considered to be shallow. See lagoon supporting document for further details
Barrier: connectivity between lagoon and sea	Permeability	Appropriate hydrological connections between lagoons and sea, including where necessary, appropriate management	The lagoons within this site exhibit a variety of barrier types including cobble/shingle, karst and artificial embankment. See lagoon supporting document for further details
Water quality: chlorophyll a	µg/L	Annual median chlorophyll a within natural ranges and less than 5µg/L	Target based on Roden and Oliver (2010). See lagoon supporting document for further details
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	Annual median MRP within natural ranges and less than 0.1mg/L	Target based on Roden and Oliver (2010). See lagoon supporting document for further details
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Annual median DIN within natural ranges and less than 0.15mg/L	Target based on Roden and Oliver, 2010). See lagoon supporting document for further details
Depth of macrophyte colonisation	Metres	Macrophyte colonisation to maximum depth of lagoons	As these lagoons are all shallow, it is expected the macrophytes should extend to their deepest points. See lagoon supporting document for further details
Typical plant species	number and m <sup>2</sup>	Maintain number and extent of listed lagoonal specialists, subject to natural variation	Species listed in Oliver, 2007. See lagoon supporting document for further details
Typical animal species	number	Maintain listed lagoon specialists, subject to natural variation	Species listed in Oliver, 2007. See lagoon supporting document for further details
Negative indicator species	Number and % cover	Negative indicator species absent or under control	Low salinity, shallow water and elevated nutrient levels increase the threat of un-natural encroachment by reedbeds

## Conservation objectives for: Lower River Shannon SAC [002165]

### 1160 Large shallow inlets and bays

To maintain the favourable conservation condition of Large shallow inlets and bays in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 7	Habitat area was estimated as 35,282ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand with <i>Scolelepis squamata</i> and <i>Pontocrates</i> spp. community; Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Subtidal sand to mixed sediment with <i>Nucula nucleus</i> community complex; Subtidal sand to mixed sediment with <i>Nephtys</i> spp. community complex; Furoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone-dominated subtidal reef community; and <i>Laminaria</i> -dominated community complex. See map 9	The likely area of these communities was derived from intertidal and subtidal surveys in 2010 (Aquafact, 2011a and c). See marine supporting document for further details

## Conservation objectives for: Lower River Shannon SAC [002165]

### 1170 Reefs

To maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	The distribution of Reefs is stable, subject to natural processes. See map 8	Distribution is established from intertidal and subtidal reef surveys in 2010 (Aquafact, 2011b and c)
Habitat area	Hectares	The permanent habitat area is stable, subject to natural processes. See map 8	Habitat area was estimated as 21,421ha from the 2010 intertidal and subtidal reef survey (Aquafact 2011b and c)
Community distribution	Hectares	Conserve the following reef community types in a natural condition: Furoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone-dominated subtidal reef community; and <i>Laminaria</i> -dominated community complex. See map 9	Based on the 2010 intertidal and subtidal reef survey (Aquafact, 2011b and c). See marine supporting document for further details

## Conservation objectives for: Lower River Shannon SAC [002165]

### 1220 Perennial vegetation of stony banks

To maintain the favourable conservation condition of Perennial vegetation of stony banks in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession	Current area unknown. It was recorded to be present but extent was not mapped from nine sub-sites during the National Shingle Beach Survey (Moore and Wilson, 1999): Ross Bay, Kilbaha Bay, Clooncneen Lough and Rinevella Bay, Carrigholt Bay, Ballymacrinan Bay, Bunaclugga Bay, Corcas and Sandhills, Bromore and Ballybunnion. NB further unsurveyed areas maybe present within the site
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 10 for recorded locations	Full distribution currently unknown. An excellent array of shingle beaches is known to occur, including three that are ranked of high interest (Ross Bay, Bunaclugga Bay and Clooncneen Lough and Rinevella), the last of which is associated with a lagoonal system (Moore and Wilson, 1999). Habitat likely to be more widespread. See coastal habitats supporting document for further details. See also the conservation objective for coastal lagoons (1150)
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Moore and Wilson (1999). Shingle features are relatively stable in the long-term and shingle beaches within this SAC appear to be functioning naturally with few artificial restrictions to beach dynamics (Moore and Wilson, 1999). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Moore and Wilson (1999). Lichens are present at Ross Bay and Clooncneen and Rinevella Bay indicating a degree of stability. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones	The Carrigaholt sub-site is a small site with a diverse flora. The Bunaclugga Bay sub-site supports yellow horned-poppy ( <i>Glaucium flavum</i> ), which contributes to the site's high interest ranking. Based on data from Moore and Wilson (1999). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Moore and Wilson (1999). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. See coastal habitats supporting document for further details

**Conservation objectives for: Lower River Shannon SAC [002165]**

**1230 Vegetated sea cliffs of the Atlantic and Baltic coasts**

To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat length	Kilometres	Area stable or increasing, subject to natural processes, including erosion. For sub-sites mapped: Kilbaha- 4.1km; Ladder Rock- 1.0km; Moyarta- 0.9km; Lisheencrony- 1.1km; Burrane- 0.2km; Kerry Head- 33.4km; Ballybunion- 15.6km; Kilclogher- 4.9km; Loop Head- 6.1km. See map 11	Based on data from the Irish Sea Cliff Survey (ISCS) (Barron et al., 2011). Nine sub-sites were identified using a combination of aerial photos and the DCENR helicopter viewer. The length of each cliff was measured (in some cases the cliff was measured in sections) to give a total estimated area of 67.3km within the SAC. Cliffs are linear features and are therefore measured in kilometres. Length of cliff likely to be underestimated. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 11	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). Most of the SAC west of Kilcredaun Point and Kilconly Point is bounded by high rocky sea cliffs. Both hard and soft cliffs occur in this SAC (ISCS; Browne, 2005). See coastal habitats supporting document for further details
Physical structure: functionality and hydrological regime	Occurrence of artificial barriers	No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). Maintaining natural geomorphological processes including natural erosion is important for the health of vegetated sea cliff. Hydrological processes maintain flushes and in some cases tufa formations that can be associated with sea cliffs. Freshwater seepage was noted from the cliffs at Loop Head and Kilclogher. Stream or cascade was noted from Kerry Head. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of sea cliff habitat zonation including transitional zones, subject to natural processes including erosion and succession	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). At Loop Head sub-site the zones recorded were: splash, crevice ledge and ungrazed coastal grassland on hard cliffs. At Kerry Head sub-site the zones recorded were: splash, pioneer, crevice ledge, ungrazed/grazed coastal grassland on hard cliffs and coastal grassland on soft cliffs. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts

To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in the Irish Sea cliff survey (Barron et al., 2011)	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details
Vegetation composition: bracken and woody species	Percentage	Cover of bracken ( <i>Pteridium aquilinum</i> ) on grassland and/or heath to be less than 10%. Cover of woody species on grassland and/or heath to be less than 20%	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details



**Conservation objectives for: Lower River Shannon SAC [002165]**

**1310 *Salicornia* and other annuals colonizing mud and sand**

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle - 0.005ha; Inishdea, Owenshere - 0.003ha; Knock - 0.029ha; Querin - 0.185ha; Rinevilla Bay - 0.001ha. See map 12	Based on data from Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Habitat recorded at five of the ten sub-sites surveyed and mapped, giving a total estimated area of 0.223ha. NB further unsurveyed areas may be present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 12 for known distribution	Based on data from McCorry and Ryle (2009). Habitat recorded at six out of ten sub-sites by McCorry and Ryle (2009). NB further unsurveyed areas may be present within the site. <i>Salicornia</i> is an annual species, so its distribution can vary significantly from year to year. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Sediment supply is particularly important for this pioneer saltmarsh community, as the distribution of this habitat depends on accretion rates. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creeks deliver sediment throughout saltmarsh system. Creeks and pan structures well developed in the larger sections of the marsh at Carrigafoyle, Shepperton/Fergus Estuary and Inishdea/Owenshere. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	This pioneer saltmarsh community requires regular tidal inundation. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1310 *Salicornia* and other annuals colonizing mud and sand

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	Based on data from McCorry and Ryle (2009). Species of local distinctiveness recorded include sea wormwood ( <i>Seriphidium maritimum</i> ), meadow barley ( <i>Hordeum secalinum</i> ) and hard grass ( <i>Parapholis strigosa</i> ) (McCorry and Ryle, 2009; internal NPWS files). See coastal habitats supporting document for further details
Vegetation structure: negative indicator species- <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1%	Based on data from McCorry and Ryle (2009). <i>Spartina</i> was recorded at all sub-sites and is considered a significant threat to the habitat. See coastal habitats supporting document for further details

**Conservation objectives for: Lower River Shannon SAC [002165]**

**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 6.774ha; Barrigone, Aughinish- 10.288ha; Beagh- 0.517ha; Bunratty- 26.939ha; Shepperton, Fergus Estuary- 37.925ha; Inishdea, Owenshere- 18.127ha; Killadysert, Inishcorker- 2.604ha; Knock- 0.576ha; Querin- 3.726ha; Rinevilla Bay- 11.883ha. See map 12	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle 2009). Ten sub-sites that supported Atlantic salt meadow were mapped (119.36ha) and additional areas of potential saltmarsh (376.07ha) were identified from an examination of aerial photographs, giving a total estimated area of 495.43ha. Saltmarsh habitat also occurs at 11 other sub-sites within the SAC (Curtis and Sheehy-Skeffington, 1998). NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 12 for mapped distribution	Based on data from McCorry and Ryle (2009). Within the sites surveyed by the SMP, estuary type saltmarsh over a mud substrate is most common and ASM is the dominant saltmarsh habitat. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). Embankments along much of the shoreline are a feature of this SAC. These embankments were erected in the past and much of the site has been remodelled and large areas of land reclaimed as a result. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creeks and pan structures well developed at the larger sections of ASM in the Carrigafoyle sub-site. At the ASM at Shepperton, Fergus Estuary, the larger patches still retain a natural creek and salt pan structure. At Inishdea, Owenshere sub-site within some of the intact saltmarsh, there is a complex network of creeks, salt pans and depressions. At Killadysart, Inishcorker and Querin, creek and pan development is generally poor. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). Zonations to other saltmarsh habitats as well as brackish and terrestrial habitats were recorded at all sub-sites. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). All of the sub-sites are grazed to some extent. Overgrazing was noted from Carrigafoyle, Shepperton, Fergus Estuary and Knock sub-sites. See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of the saltmarsh area vegetated	Based on data from McCorry and Ryle (2009). Some poaching was noted from most of the sub-sites. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species- <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1%	Based on data from McCorry and Ryle (2009). <i>Spartina</i> is a major element of the vegetation at all sub-sites in this SAC. See coastal habitats supporting document for further details

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1349 Bottlenose Dolphin *Tursiops truncatus*

To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 16 for suitable habitat	See marine supporting document for further details
Habitat use: critical areas	Location and hectares	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition. See map 16	Attribute and target based on Ingram and Rogan (2002), Englund et al. (2007), Englund et al. (2008), Berrow (2009), Berrow et al. (2010) and review of data from other studies. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site	See marine supporting document for further details

**Conservation objectives for: Lower River Shannon SAC [002165]****1355 Otter *Lutra lutra***

To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in Shannon catchment estimated at 70.5% (Bailey and Rochford 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 4,461.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometers	No significant decline. Length mapped and calculated as 500.1km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 125.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 17	Otters will regularly commute across stretches of open water up to 500m. e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

## Conservation objectives for: Lower River Shannon SAC [002165]

### 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 4.193ha; Barrigone, Aughinish- 2.407ha; Bunratty- 0.865ha; Inishdea, Owenshere- 11.609ha; Killadysert, Inishcorker- 0.705ha; Knock- 0.143ha, Querin- 0.008ha; Rinevilla Bay- 2.449ha. See map 12	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Eight sub-sites that support Mediterranean salt meadow were mapped (22.379ha) and additional areas of potential saltmarsh (25.646ha) were identified from an examination of aerial photographs, giving a total estimated area of 48.025ha. Saltmarsh habitat also occurs at 11 other sub-sites within the SAC (Curtis and Sheehy-Skeffington, 1998). NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 12 for known distribution	Based on data from McCorry and Ryle (2009). Within the sites surveyed by the SMP, estuary type saltmarsh over a mud substrate is most common. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). Embankments along much of the shoreline are a feature of this SAC. These embankments were erected in the past and much of the site has been remodelled and large areas of land reclaimed because of them. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). The MSM at Carrigafoyle contains some large salt pans. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Mediterranean salt meadow is found high up in the saltmarsh but requires occasional tidal inundation. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). Zonations to other saltmarsh habitats as well as brackish and terrestrial habitats were recorded at most sub-sites. See coastal habitats supporting document for further details

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). All of the sub-sites are grazed to some extent. Overgrazing was noted from Inishdea, Owenshere and Knock sub-sites. See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from McCorry and Ryle (2009). Some poaching was noted from most of the sub-sites. See coastal habitats supporting document for further details
Vegetation composition: typical species	Percentage cover	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1%	Based on data from McCorry and Ryle (2009). <i>Spartina</i> is a major element of the vegetation at all sub-sites in this SAC. See coastal habitats supporting document for further details



**Conservation objectives for: Lower River Shannon SAC [002165]**

**3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation**

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	Three sub-types of high conservation value are known to occur in the site. See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details. <b>Note: rooted macrophytes should be absent or trace (&lt; 5% cover) in freshwater pearl mussel (<i>Margaritifera margaritifera</i>) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Cloon River within this SAC, because the mussel requires environmental conditions closer to natural background levels</b>
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 13	See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details
Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details
Hydrological regime: freshwater seepages	Metres per second	Maintain appropriate freshwater seepage regimes	See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details
Substratum composition: particle size range	Millimetres	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (frequently sands, gravels and cobbles)	Although many of the high-conservation-value sub-types are dominated by coarse substrata, for certain sub-types, notably triangular club-rush ( <i>Schoenoplectus triquetus</i> ) and opposite-leaved pondweed ( <i>Groenlandia densa</i> ), fine substrata are required. See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	The specific targets may vary among sub-types. See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details
Riparian habitat	Area	The area of riparian woodland at and upstream of the bryophyte-rich sub-type should be maintained	See Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation supporting document for further details. See also the conservation objective for Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> ) (91E0)

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

To maintain the favourable conservation condition of *Molinia* meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caeruleae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Full extent of this habitat in this site is currently unknown- see distribution below
Habitat distribution	Occurrence	No decline, subject to natural processes	This habitat has been recorded on the eastern bank of the Shannon, just north of Castleconnell, Co. Limerick (NPWS internal files). Full distribution of this habitat in this site is currently unknown and it almost certainly occurs elsewhere. The Irish semi-natural grasslands survey will cover Co. Limerick in 2012 and additional information is likely to be available following this survey
Vegetation structure: broadleaf herb: grass ratio	Percentage	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2010)
Vegetation structure: sward height	Percentage	30-70% of sward between 10 and 80cm high	Attribute and target based on O'Neill et al. (2010)
Vegetation composition: typical species	Number	At least 7 positive indicator species present, including 1 "high quality" species	List of positive indicator species, including high quality species, identified by O'Neill et al. (2010). Note that purple moor-grass ( <i>Molinia caerulea</i> ) is a positive indicator species, but not necessarily an essential component of the habitat
Vegetation composition: notable species	Number	No decline, subject to natural processes	A number of notable species have been recorded in this habitat at this site including smooth brome ( <i>Bromus racemosus</i> ), pale sedge ( <i>Carex pallescens</i> ) and blue-eyed grass ( <i>Sisyrinchium bermudiana</i> ) (Reynolds et al., 2006)
Vegetation composition: negative indicator species	Percentage	Negative indicator species collectively not more than 20% cover, with cover by an individual species less than 10%. Non-native invasive species, absent or under control	List of negative indicator species identified by O'Neill et al. (2010)
Vegetation composition: negative indicator moss species	Percentage	Bog mosses ( <i>Sphagnum</i> spp.) not more than 10% cover; hair mosses ( <i>Polytrichum</i> spp.) not more than 25% cover	Attribute and target based on O'Neill et al. (2010)

**Conservation objectives for: Lower River Shannon SAC [002165]****6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)**

To maintain the favourable conservation condition of *Molinia* meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caeruleae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: woody species and bracken ( <i>Pteridium aquilinum</i> )	Percentage	Cover of woody species and bracken not more than 5% cover	Attribute and target based on O'Neill et al. (2010)
Physical structure: bare ground	Percentage	Not more than 10% bare ground	Attribute and target based on O'Neill et al. (2010)

**Conservation objectives for: Lower River Shannon SAC [002165]**
**91E0 \*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)**

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

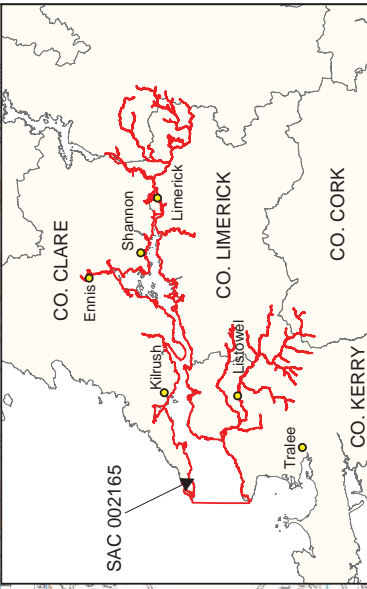
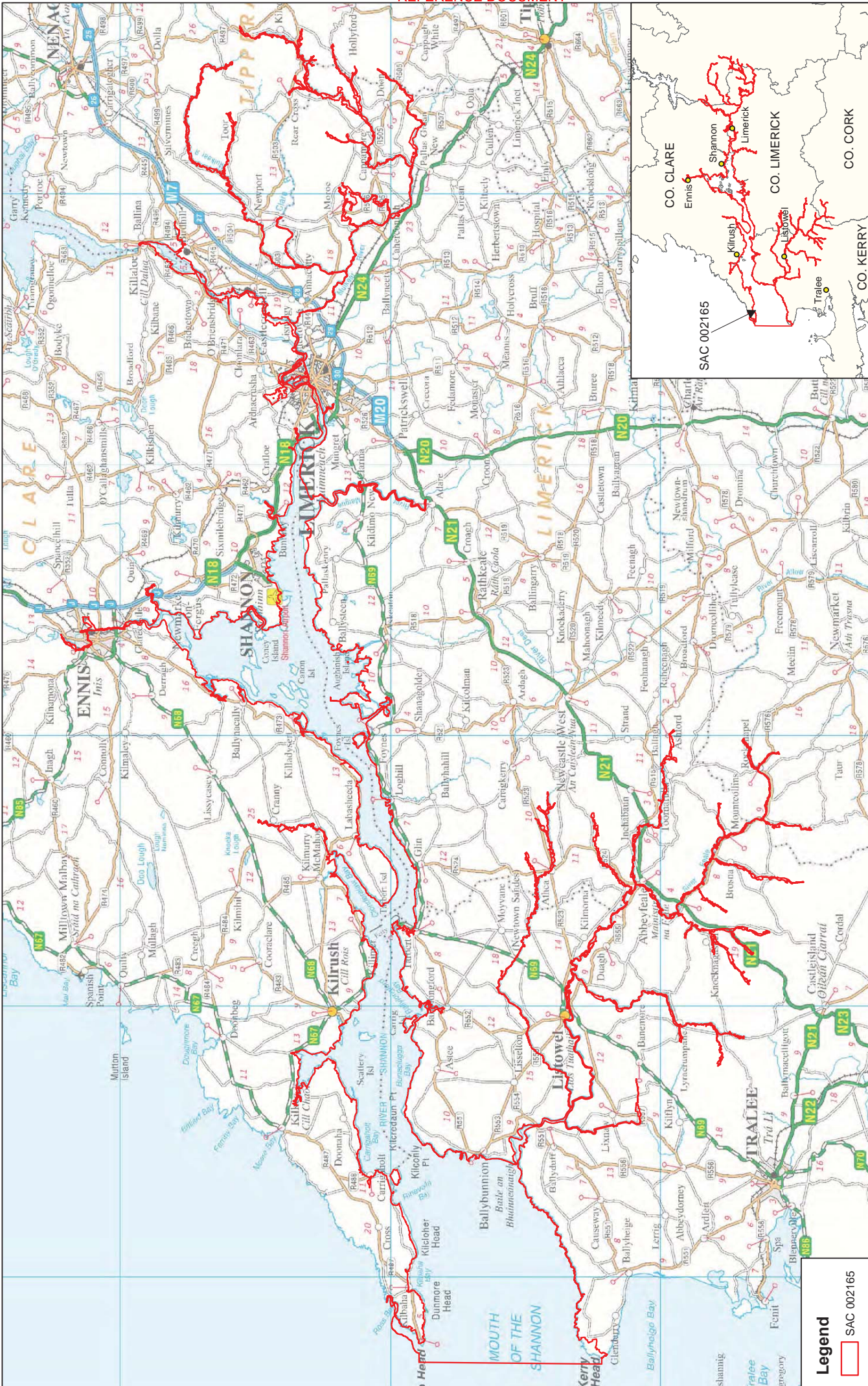
Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed. See map 14	Minimum area, based on 5 sites surveyed by Perrin et al. (2008) - site codes 1286, 1577, 1857, 1861, 1995. See woodland habitats supporting document for further details. NB further areas are likely to be present within the SAC
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 14	Distribution based on Perrin et al. (2008). NB further areas are likely to be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land-ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder and oak regenerate poorly. Ash often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem

### Conservation objectives for: Lower River Shannon SAC [002165]

#### 91E0 \*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-data and other rare or localised species. Perrin and Daly (2010) list four sites as containing potential ancient/long established woodland. See woodland habitats supporting document for further details
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder ( <i>Alnus glutinosa</i> ), willows ( <i>Salix</i> spp) and, locally, oak ( <i>Quercus robur</i> ) and ash ( <i>Fraxinus excelsior</i> )	Species reported in Perrin et al. (2008). See woodland habitats supporting document for further details
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: Himalayan balsam ( <i>Impatiens glandulifera</i> ), giant hogweed ( <i>Heracleum mantegazzianum</i> ), sycamore ( <i>Acer pseudoplatanus</i> )



**MAP 1: LOWER RIVER SHANNON SAC CONSERVATION OBJECTIVES SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**Legend**  
 SAC 002165

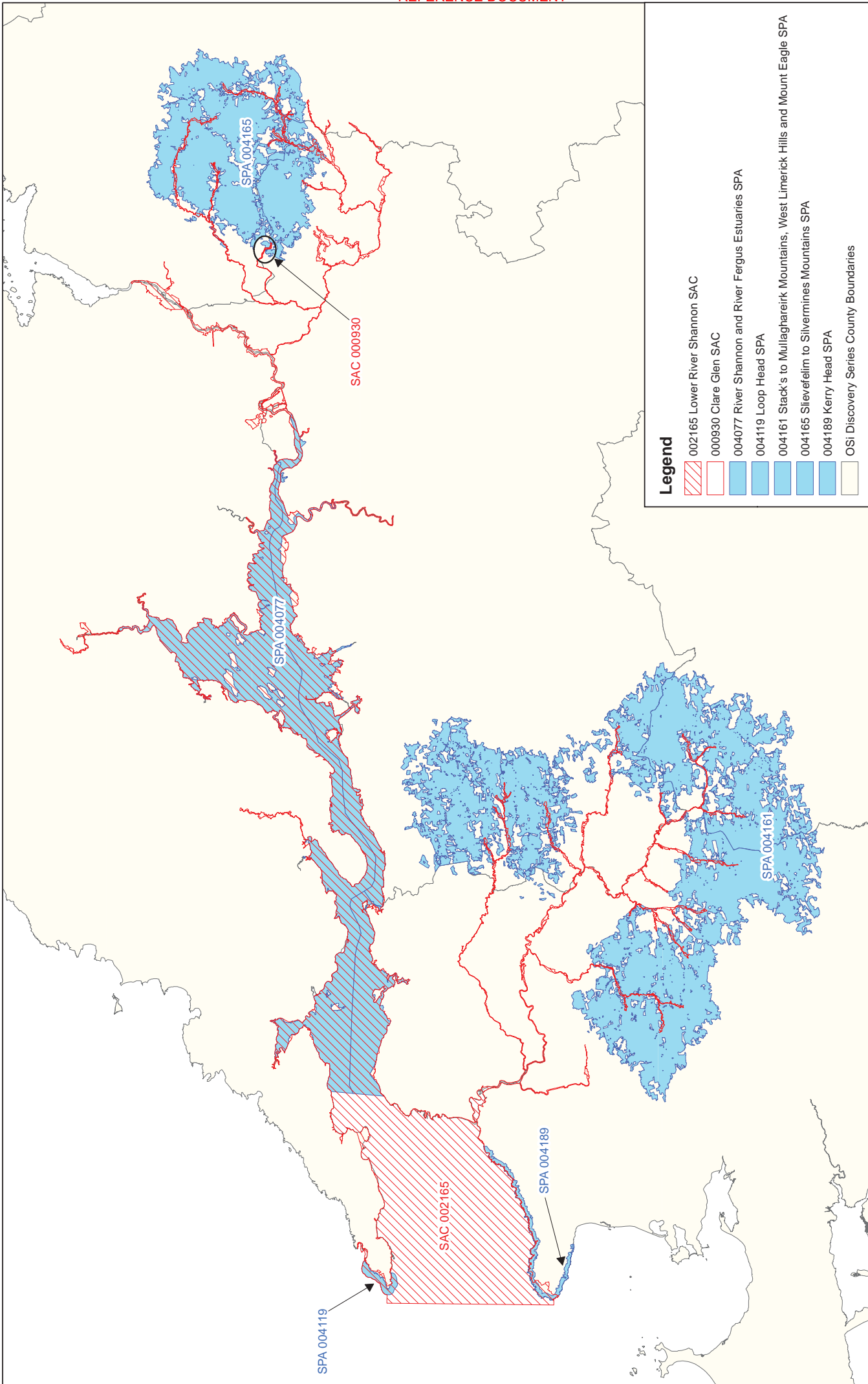
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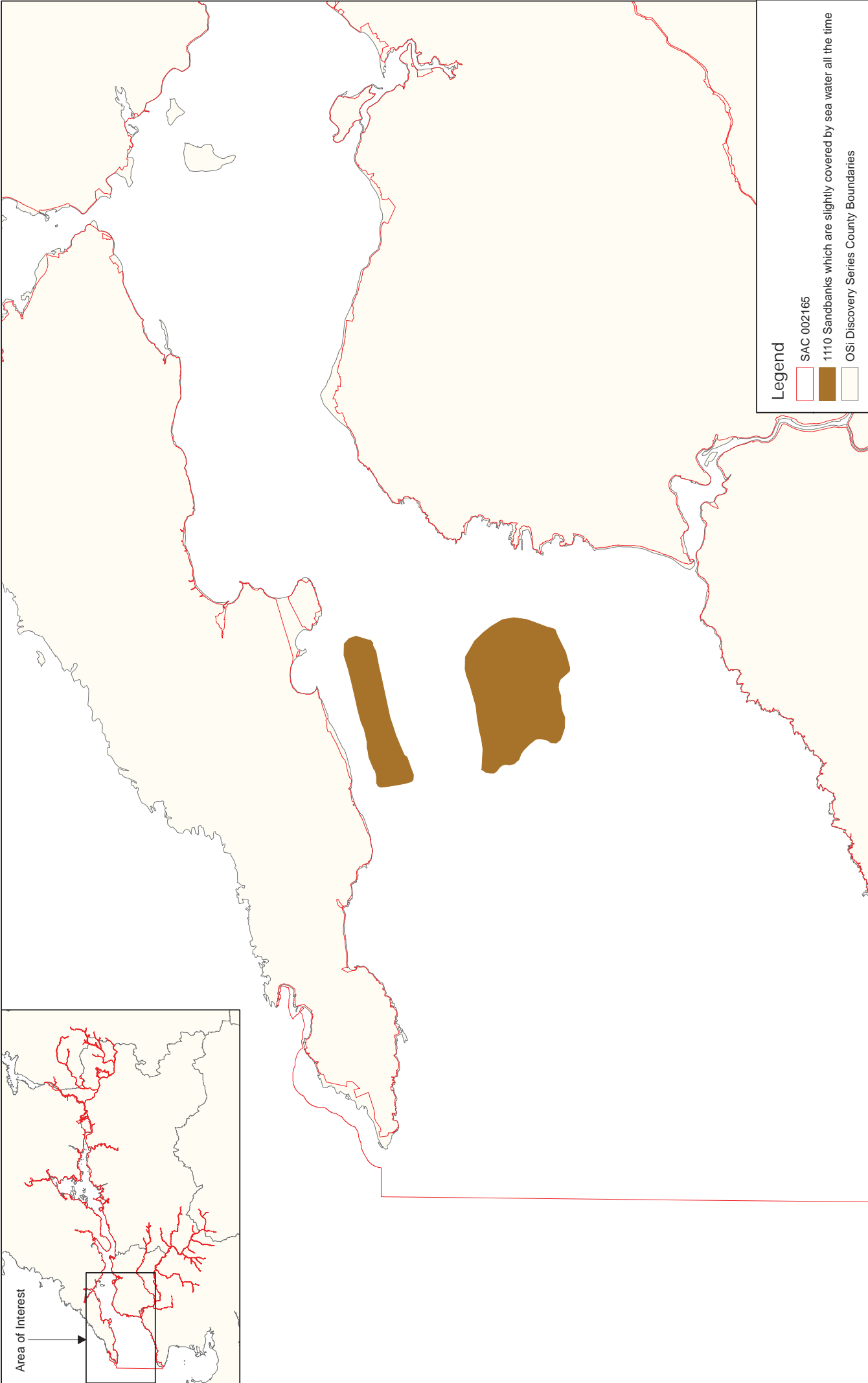
**Map Version 1**  
 Date: June 2012



**Legend**

-  002165 Lower River Shannon SAC
-  000930 Clare Glen SAC
-  004077 River Shannon and River Fergus Estuaries SPA
-  004119 Loop Head SPA
-  004161 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA
-  004165 Slievefelim to Silvermines Mountains SPA
-  004189 Kerry Head SPA
-  OSI Discovery Series County Boundaries





Legend

- SAC 002165
- 1110 Sandbanks which are slightly covered by sea water all the time
- OSi Discovery Series County Boundaries

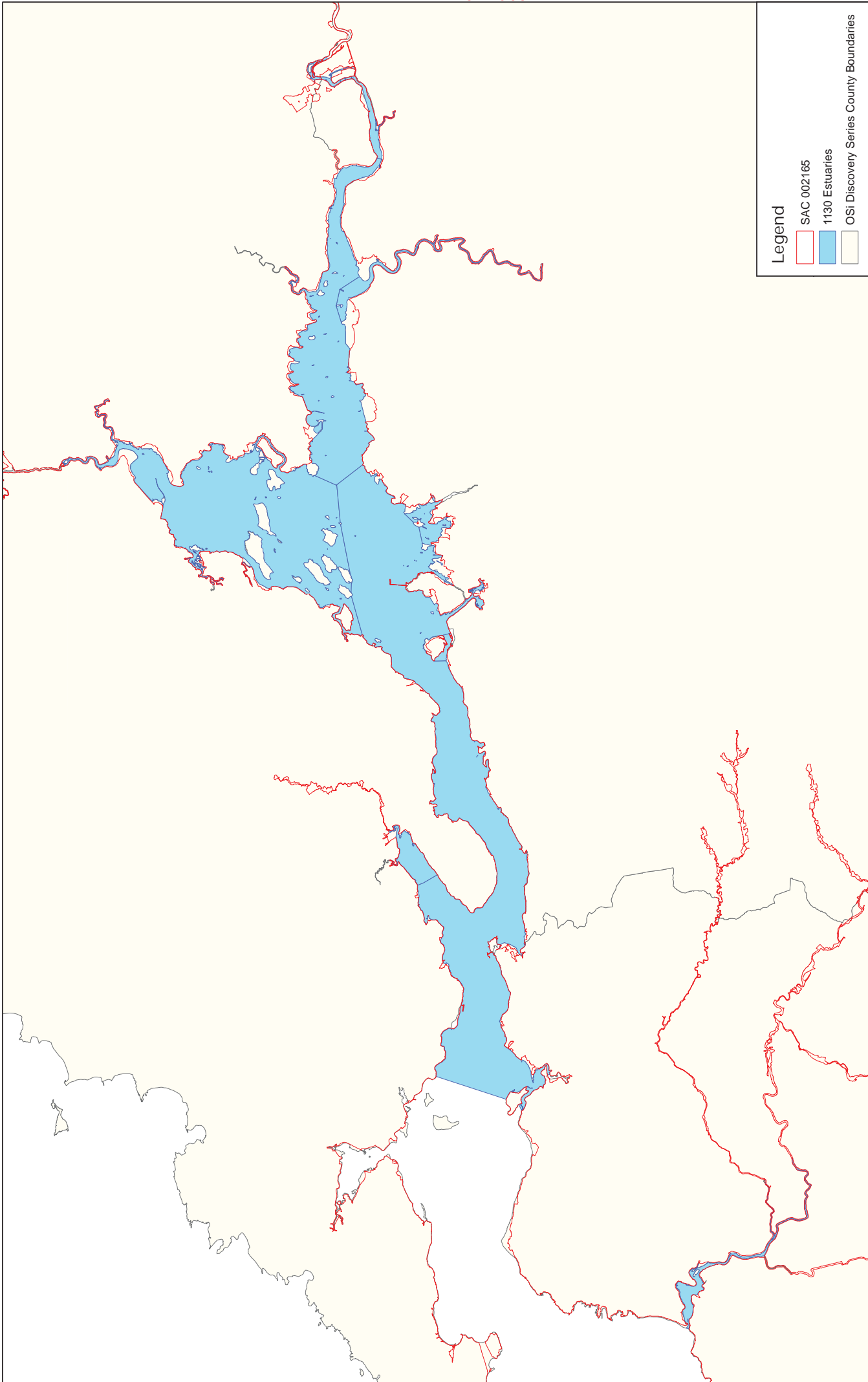
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SITE CODE: SAC002165  
 CO. CLARE: version 1.2, CO. CORK: version 1.01, CO. KERRY: version 1.11,  
 CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05



MAP 3:  
 LOWER RIVER SHANNON SAC  
 CONSERVATION OBJECTIVES  
 SANDBANKS

Map to be read in conjunction with the NPWS Conservation Objectives Document.



Legend

-  SAC 002165
-  1130 Estuaries
-  OSI Discovery Series County Boundaries

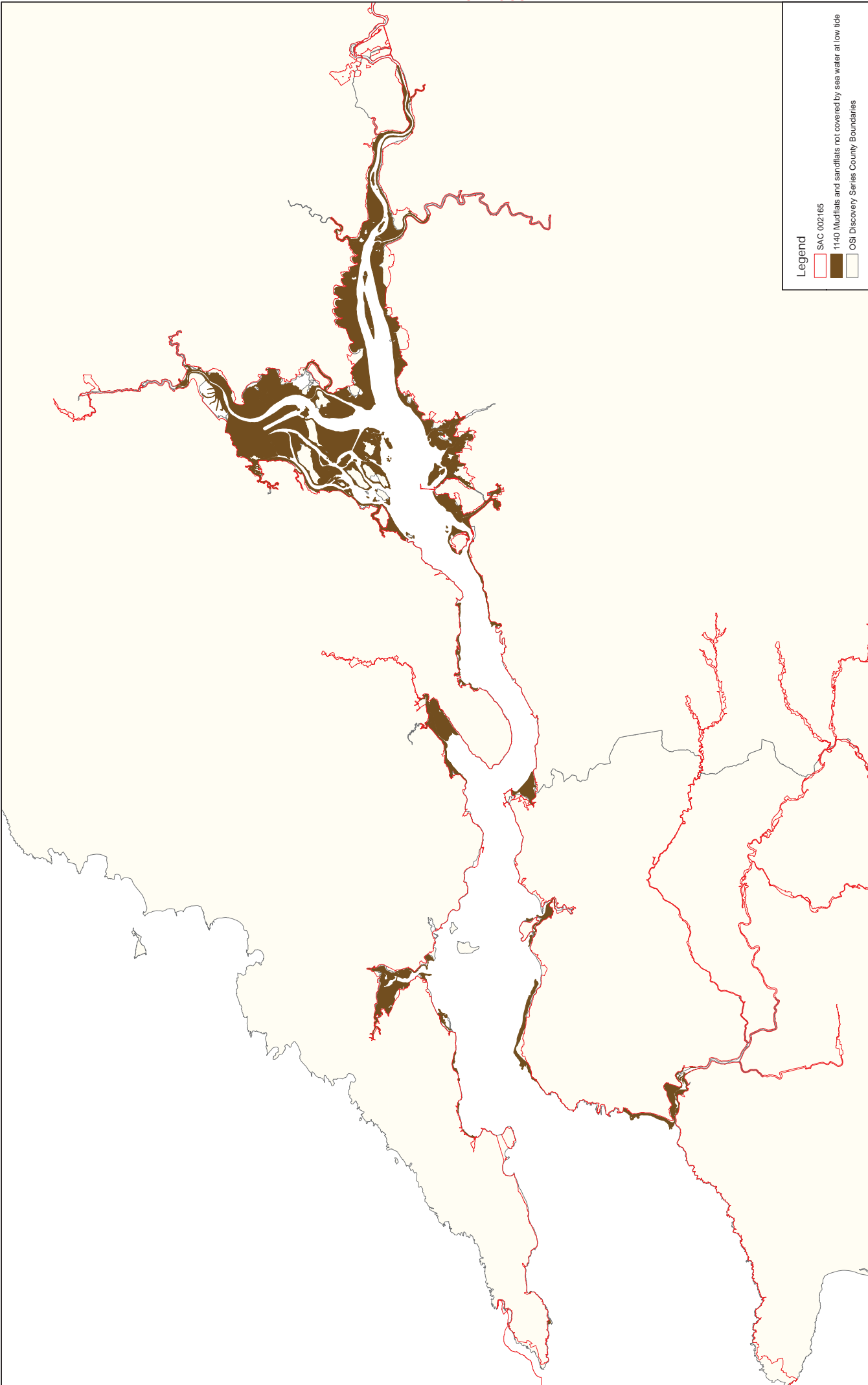
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SITE CODE: SAC002165  
 CO. CLARE: version 1.2, CO. CORK: version 1.01, CO. KERRY: version 1.11,  
 CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05



MAP 4:  
 LOWER RIVER SHANNON SAC  
 CONSERVATION OBJECTIVES  
 ESTUARIES

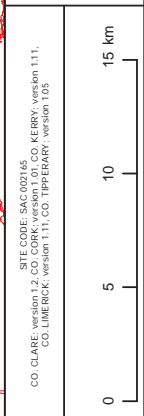
Map to be read in conjunction with the NPWS Conservation Objectives Document.



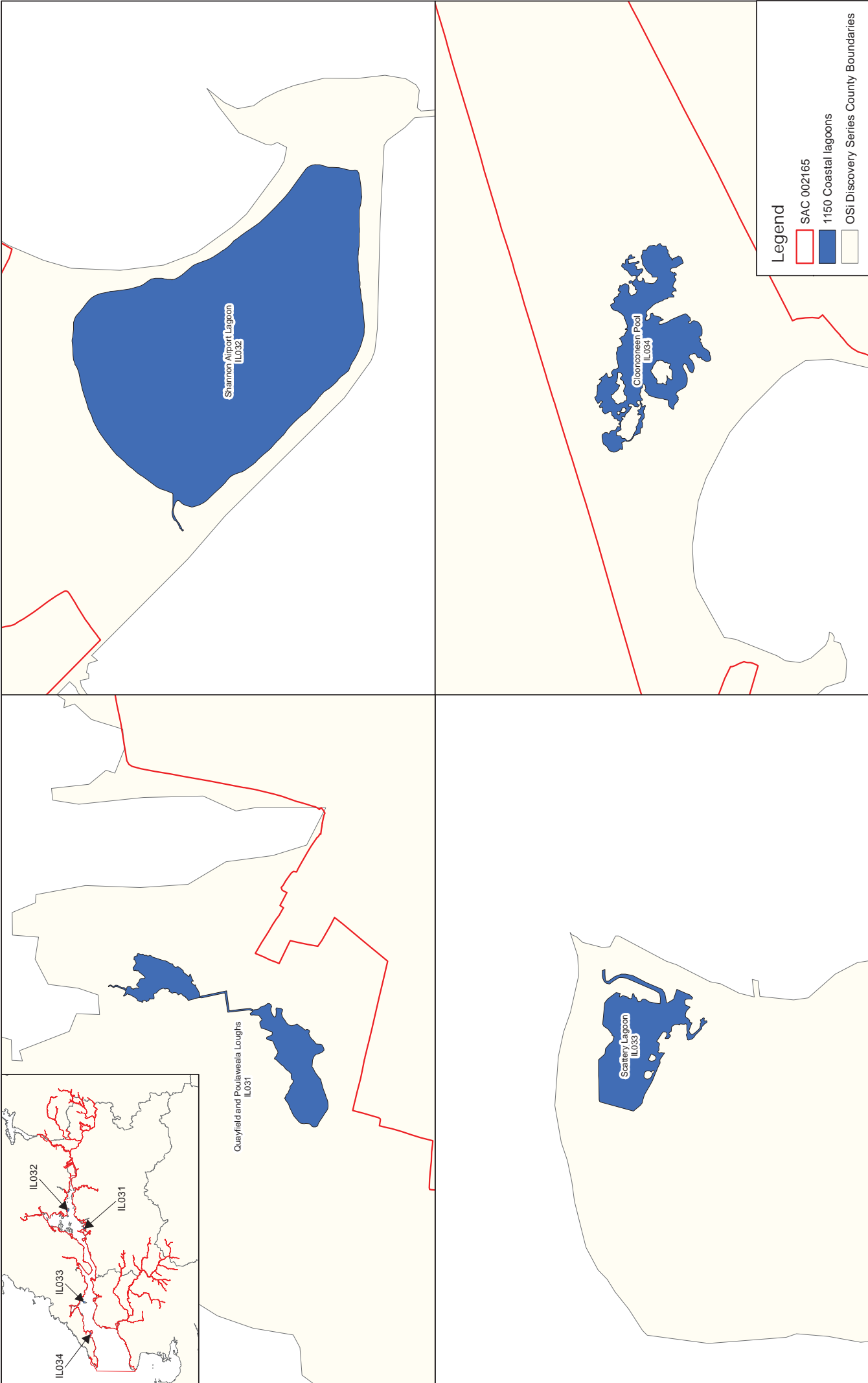
**Legend**  
 SAC 002165  
 1140 Mudflats and sandflats not covered by sea water at low tide  
 OSI Discovery Series County Boundaries

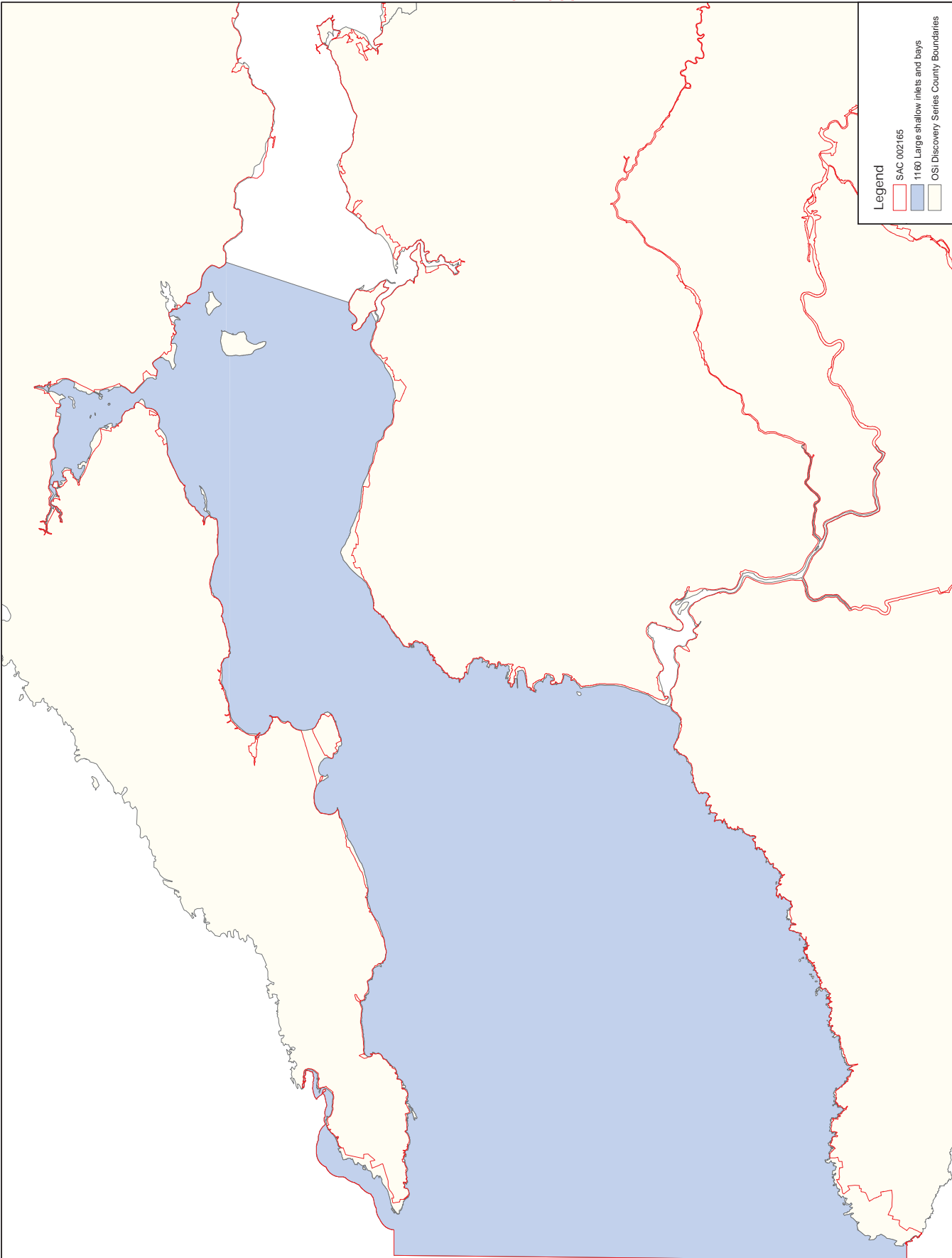
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 Map Version 1  
 Date: June 2012

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**MAP 5:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**TIDAL MUDFLATS AND SANDFLATS**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document.






**Legend**

- SAC 002165
- 1160 Large shallow inlets and bays
- OSI Discovery Series County Boundaries

  
 Map Version 1  
 Date: June 2012

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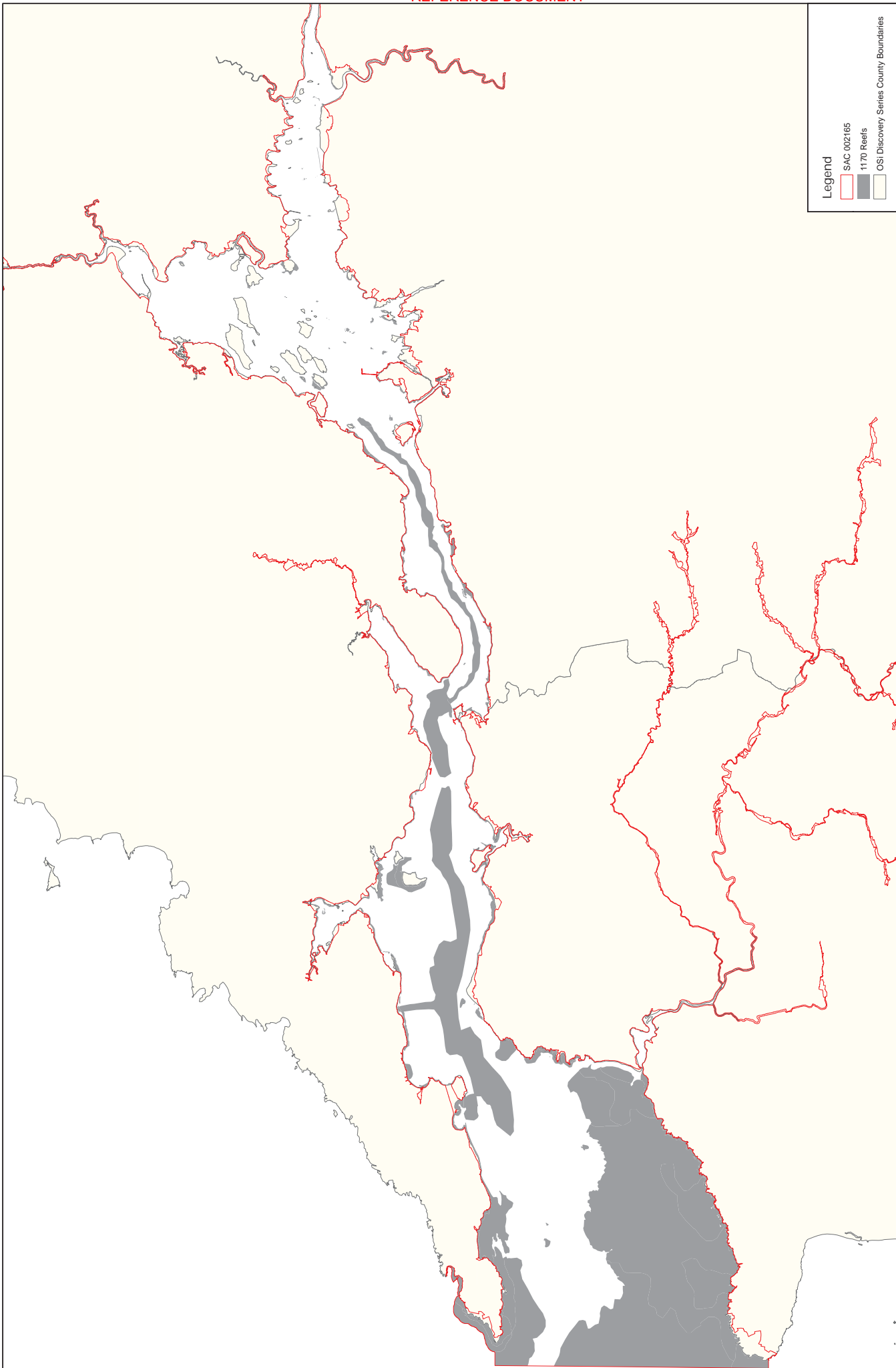
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 CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05



0 1 2 3 4 5 km

**MAP 7:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**LARGE SHALLOW INLETS AND BAYS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.



**Legend**

- SAC 002165
- 1170 Reefs
- OSI Discovery Series County Boundaries

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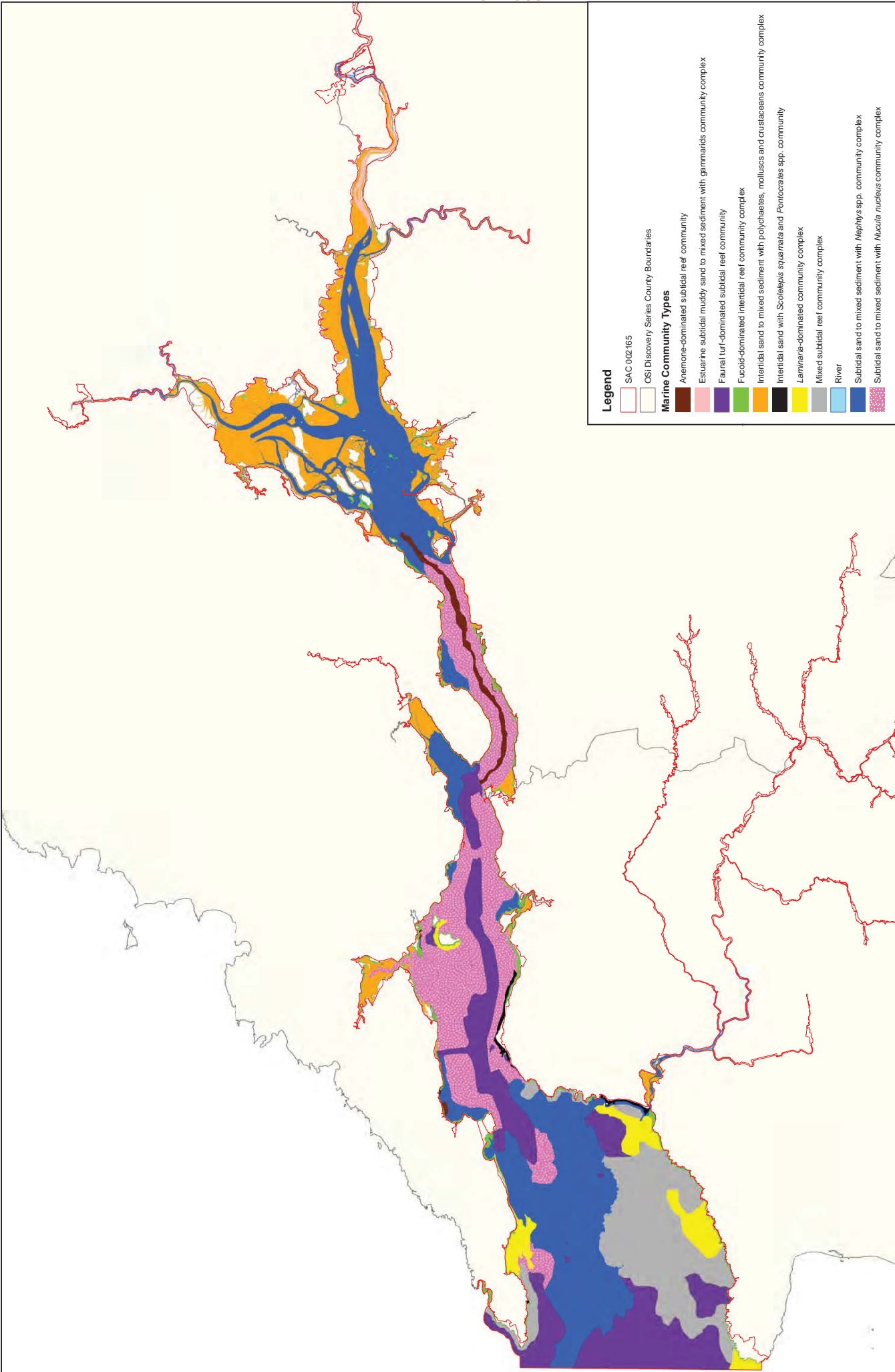
Map Version 1  
 Date: June 2012

Scale: 0 5 10 15 km

SITE CODE: SAC 002165  
 CO. CLARE: version 1.2, CO. CORK: version 1.01, CO. KERRY: version 1.11,  
 CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05

**MAP 8:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**REEFS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.



**Legend**

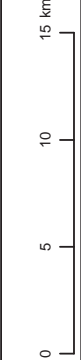
- SAC 002 165
- OSI/Discovery Series County Boundaries
- Marine Community Types**
- Avoneme-dominated subtidal reef community
- Estuarine subtidal muddy sand to mixed sediment with gammarids community complex
- Faunal turf-dominated subtidal reef community
- Fucoid-dominated intertidal reef community complex
- Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex
- Intertidal sand with *Scolecopsis squamata* and *Pontocrates* spp. community
- Laminaria*-dominated community complex
- Mixed subtidal reef community complex
- River
- Subtidal sand to mixed sediment with *Nephtys* spp. community complex
- Subtidal sand to mixed sediment with *Nucula nucleus* community complex

CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11,  
CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

MAP 9:  
LOWER RIVER SHANNON SAC  
CONSERVATION OBJECTIVES  
MARINE COMMUNITY TYPES

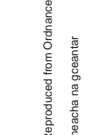
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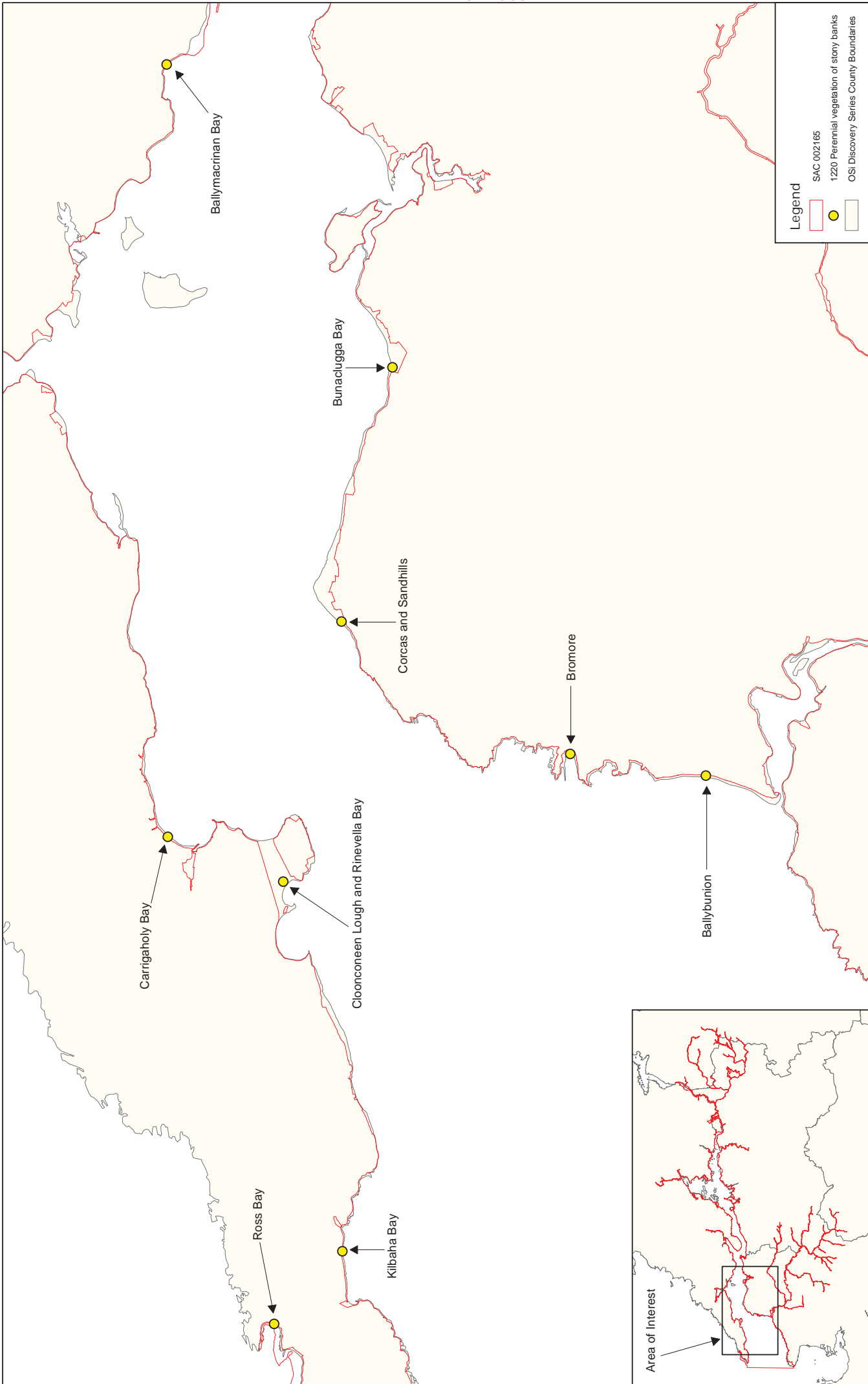
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Map to be read in conjunction with the NPWS Conservation Objectives Document.

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**MAP 10:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**PERENNIAL VEGETATION OF STONY BANKS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC002165  
CO. CLARE: version 1.2, CO. CORK: version 1.01, CO. KERRY: version 1.11,  
CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05

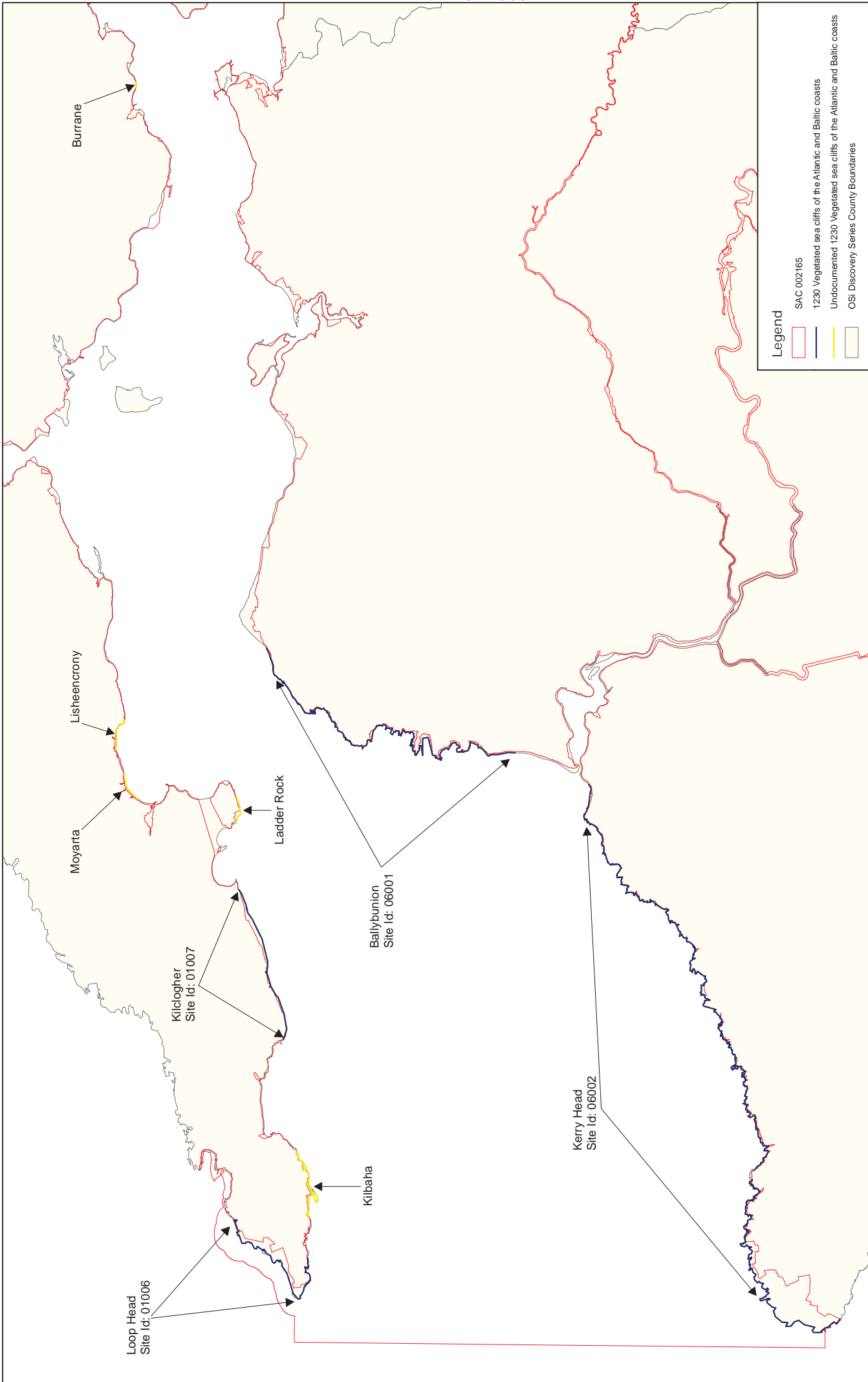
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).  
Níl síne teorainneacha ar na léarscálleanna ach nód gairbhíomhach ginearálta. Fíleadar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Míacasamhail d'ábhar na Sibbhíreachtá Ordónais le cheadúnas Riailtas (Ceadúnas Úimh. EN 0059208)

**Legend**

- SAC 002165
- 1220 Perennial vegetation of stony banks
- OSI Discovery Series County Boundaries

Map Version 1  
Date: June 2012





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Department of Arts, Heritage and the Gaeltacht

**MAP 11:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**VEGETATED SEA CLIFFS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

Map Version 1  
Date: June 2012

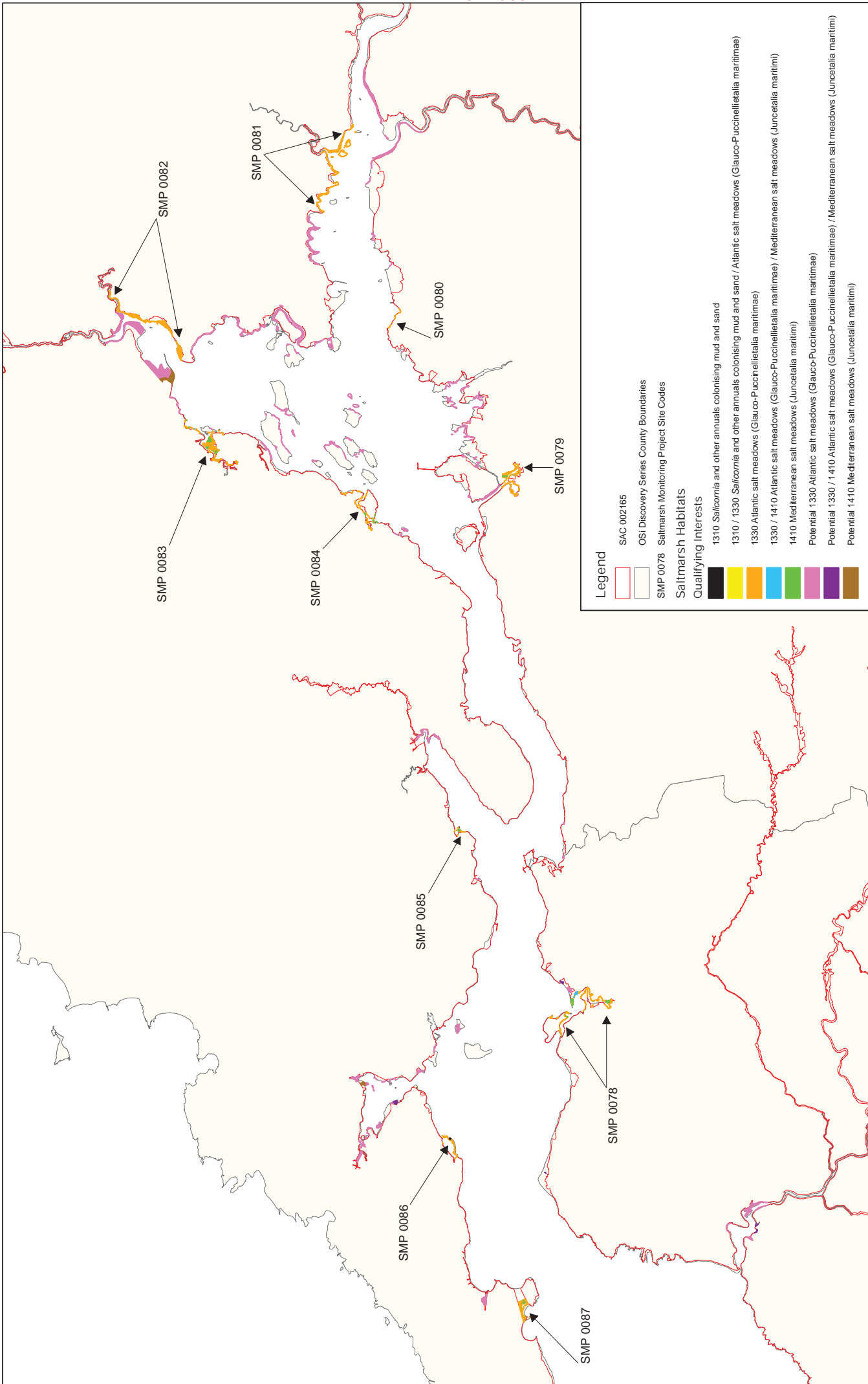
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SITE CODE: SAC00165  
CO. CLARE: version 1.2, CO. CORK: version 1.01, CO. KERRY: version 1.11,  
CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05

0 1 2 3 4 5 km

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The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).  
 Níl síne teorainneacha ar na léarscálleanna ach níl gairníomhach ginearálta. Feadfar athbhréithniú a déanamh ar theorainneacha na gceantar comharthaíthe. Macasamhail d'ábhar na Sibbhéartha Ordónais le chead on Rialtas (Ceadúnas Úimh. EN 0059208)



**Legend**

- SAC 002165
- OSI Discovery Series County Boundaries
- SMP 0078 Saltmarsh Monitoring Project Site Codes

**Saltmarsh Habitats**

**Qualifying Interests**

- 1310 *Salicornia* and other annuals colonising mud and sand
- 1310 / 1330 *Salicornia* and other annuals colonising mud and sand / Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- 1330 / 1410 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) / Mediterranean salt meadows (*Juncetalia maritimi*)
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)
- Potential 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Potential 1330 / 1410 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) / Mediterranean salt meadows (*Juncetalia maritimi*)
- Potential 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

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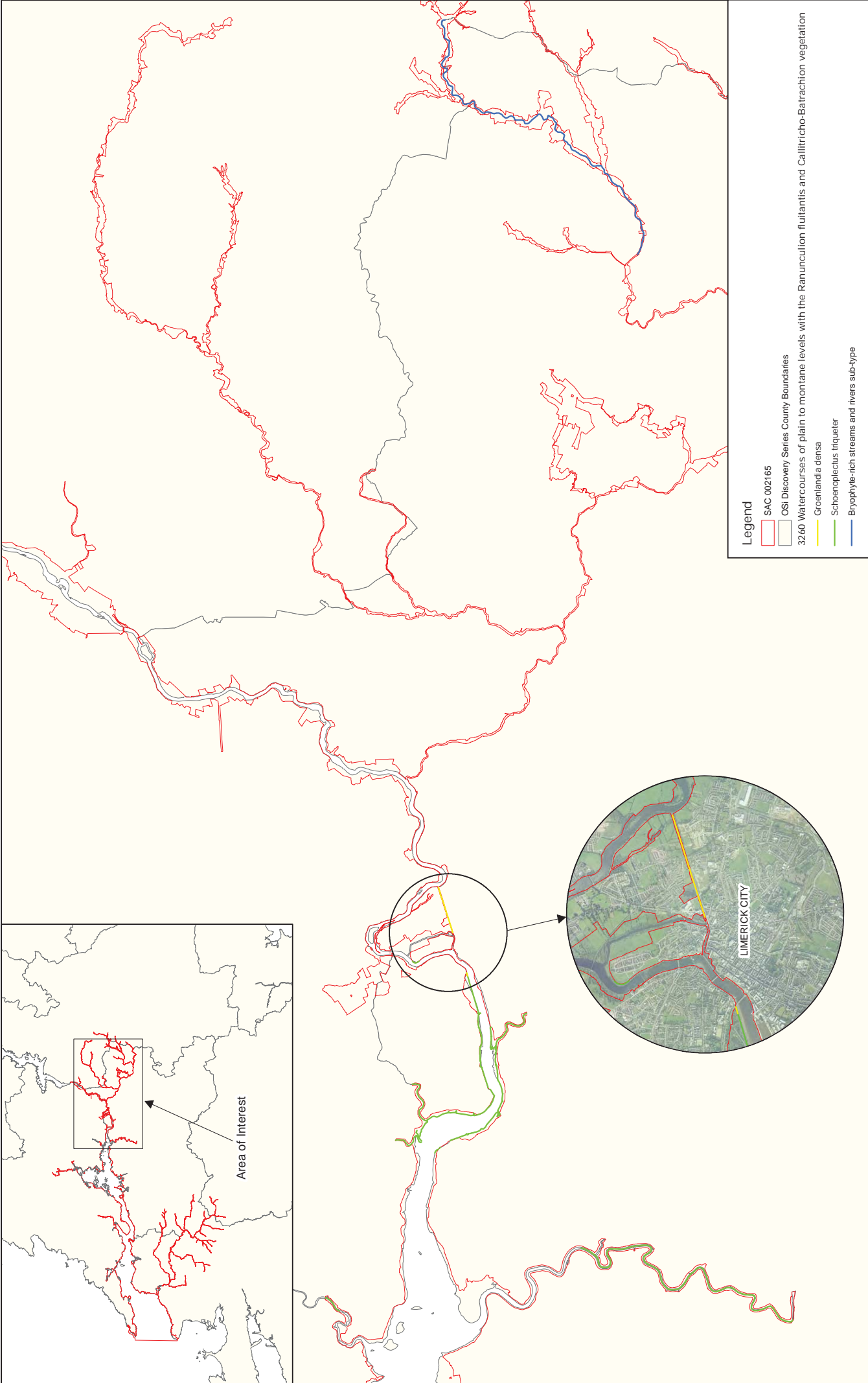
Map to be read in conjunction with the NPWS Conservation Objectives Document.

**MAP 12:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**SALT MARSH HABITATS**

SITE CODE: SAC00145  
CO. CLARE: version 1.2, CO. CORK: version 1.01, CO. KERRY: version 1.11,  
CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05

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Ní síne teorainneacha ar na léarscálanna ach nod gairneoireachta ginearálta. Fíadfar athbhreithniú a déanamh ar theorainneacha na gceantar conharthaithe. Macasamhail d'ábhar na Surbhíreachtá Ordónais le chead on Riailtas (Ceadúnas Úm, EN 0059208)

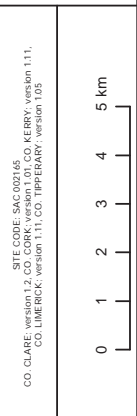
Map Version 1  
Date: June 2012



- Legend**
- SAC 002165
  - OSI Discovery Series County Boundaries
  - 3260 Watercourses of plain to montane levels with the *Ranunculus fluitans* and *Callitriche-Batrachion* vegetation
  - Groenlandia densa*
  - Schoenoplectus triquetus*
  - Bryophyte-rich streams and rivers sub-type

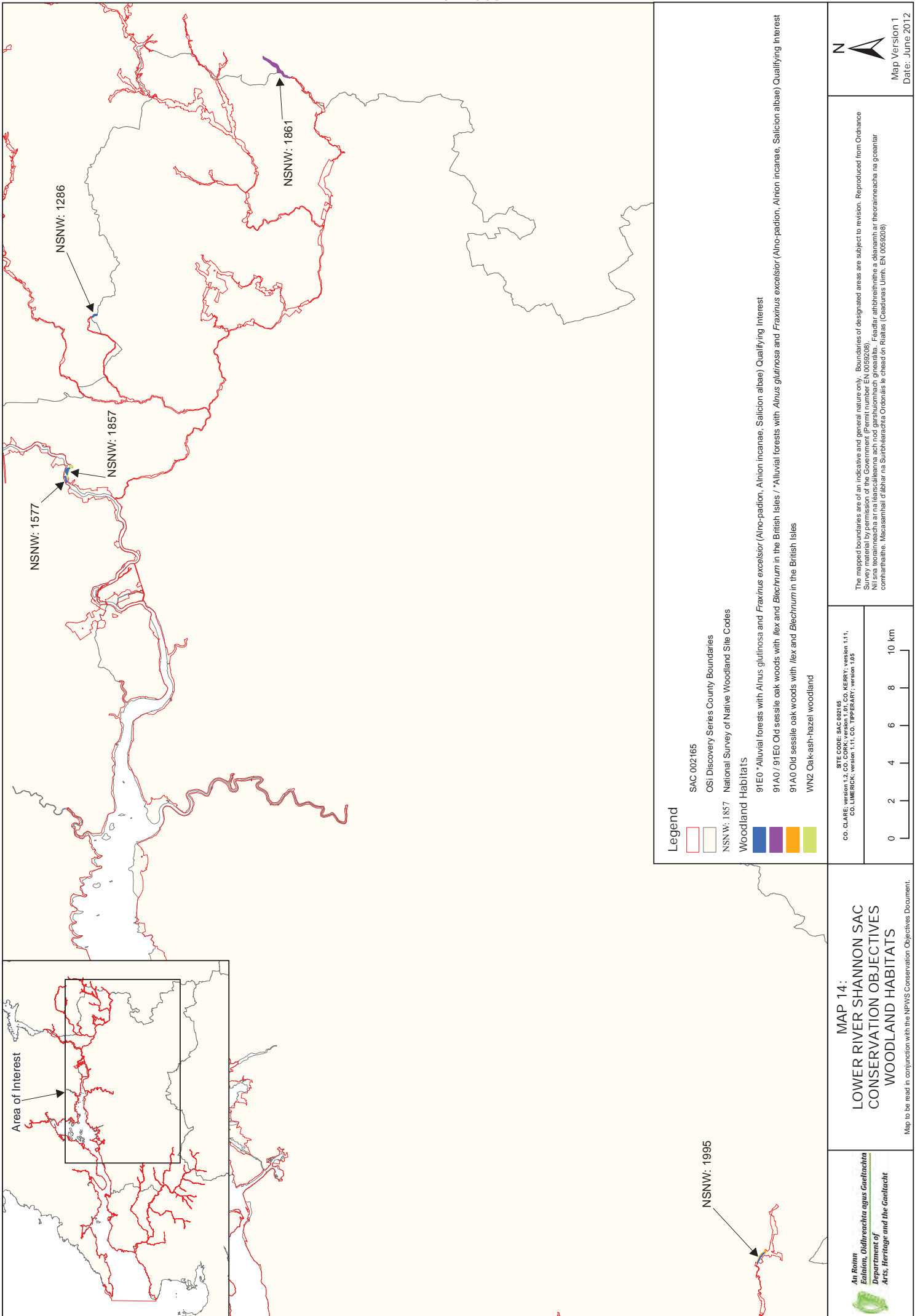
Map Version 1  
 Date: June 2012

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).  
 Níl síne teorainneacha ar na léarscálanna ach nód gairneoireachtaí ginearálta. Fíodfar athbhreithnithe a déanamh ar theorainneacha na gceantar conharthaíthe. Macasamhail d'ábhar na Sibbhíreachtá Ordúnais le chead on Rialtas (Ceadúnas Úmh. EN 0059208)



**MAP 13:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**FLOATING RIVER VEGETATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.



**Legend**

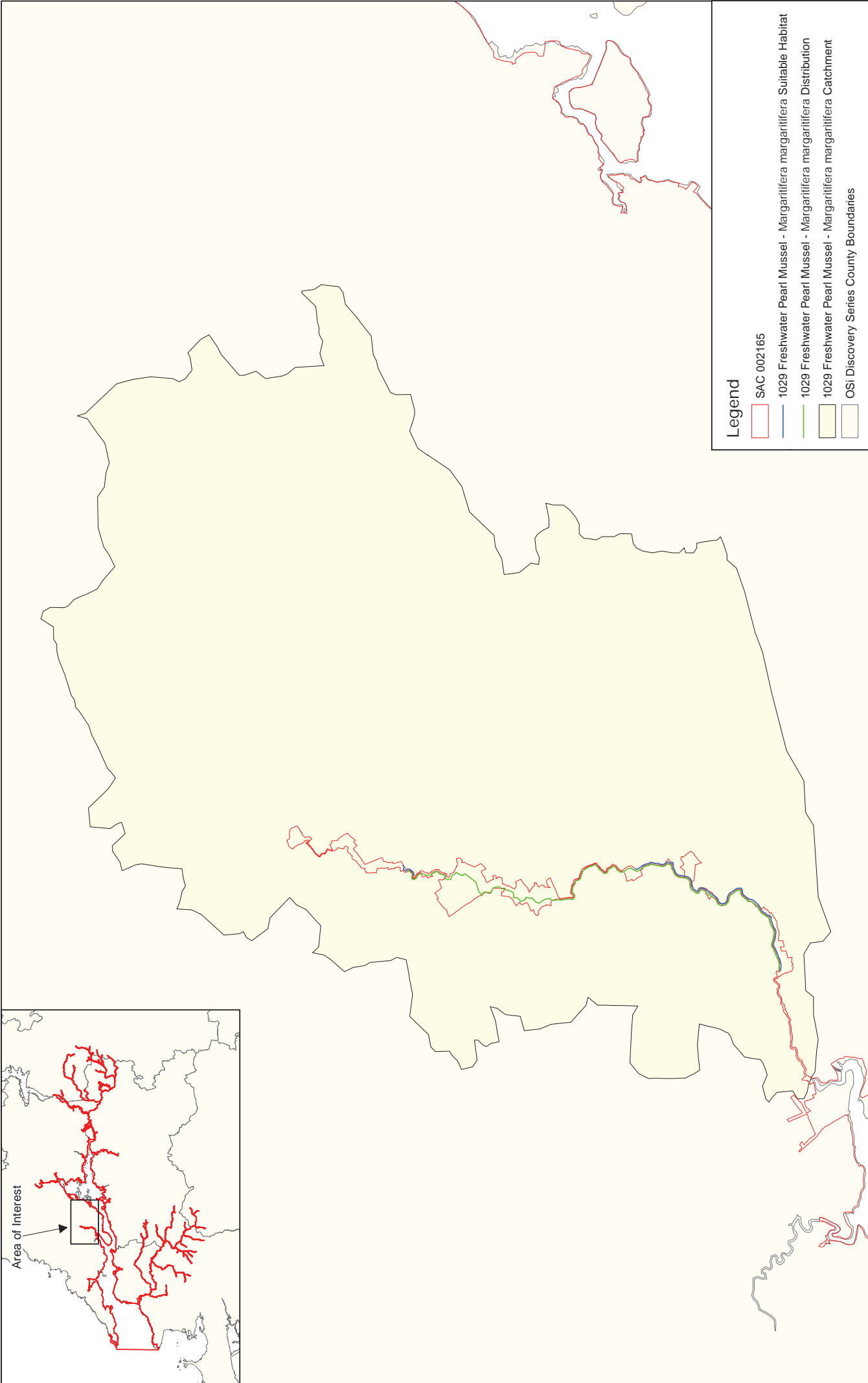
- SAC 002165
- OSI Discovery Series County Boundaries
- NSNW: 1857 National Survey of Native Woodland Site Codes
- Woodland Habitats**
  - 91E0 \*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-pádlán, Ailíon incánae, Saliccion albae) Qualifying Interest
  - 91A0/91EQ Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles / \*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-pádlán, Ailíon incánae, Saliccion albae) Qualifying Interest
  - 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
  - WN2 Oak-ash-hazel woodland

SITE CODE: SAC 002165  
 CO. CLARE, version 1.2, CO. CORK, version 1.01, CO. KERRY, version 1.11,  
 CO. LIMERICK, version 1.11, CO. TIPPERARY, version 1.05

0 2 4 6 8 10 km

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 Ní síne teorainneacha ar na léarscálanna ach nod gairneoireachta ginearálta. Feadfar athbheithníthe a déanamh ar theorainneacha na gceantar conharthaíthe. Macasamhail d'ábhar na Surbhíreachtá Ordónais le chead on Rialtas (Ceadúnas Umh. EN 0059208)

**Map Version 1**  
**Date: June 2012**



Legend

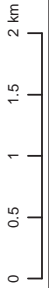
- SAC 002165
- 1029 Freshwater Pearl Mussel - Margaritifera margaritifera Suitable Habitat
- 1029 Freshwater Pearl Mussel - Margaritifera margaritifera Distribution
- 1029 Freshwater Pearl Mussel - Margaritifera margaritifera Catchment
- OSI Discovery Series County Boundaries



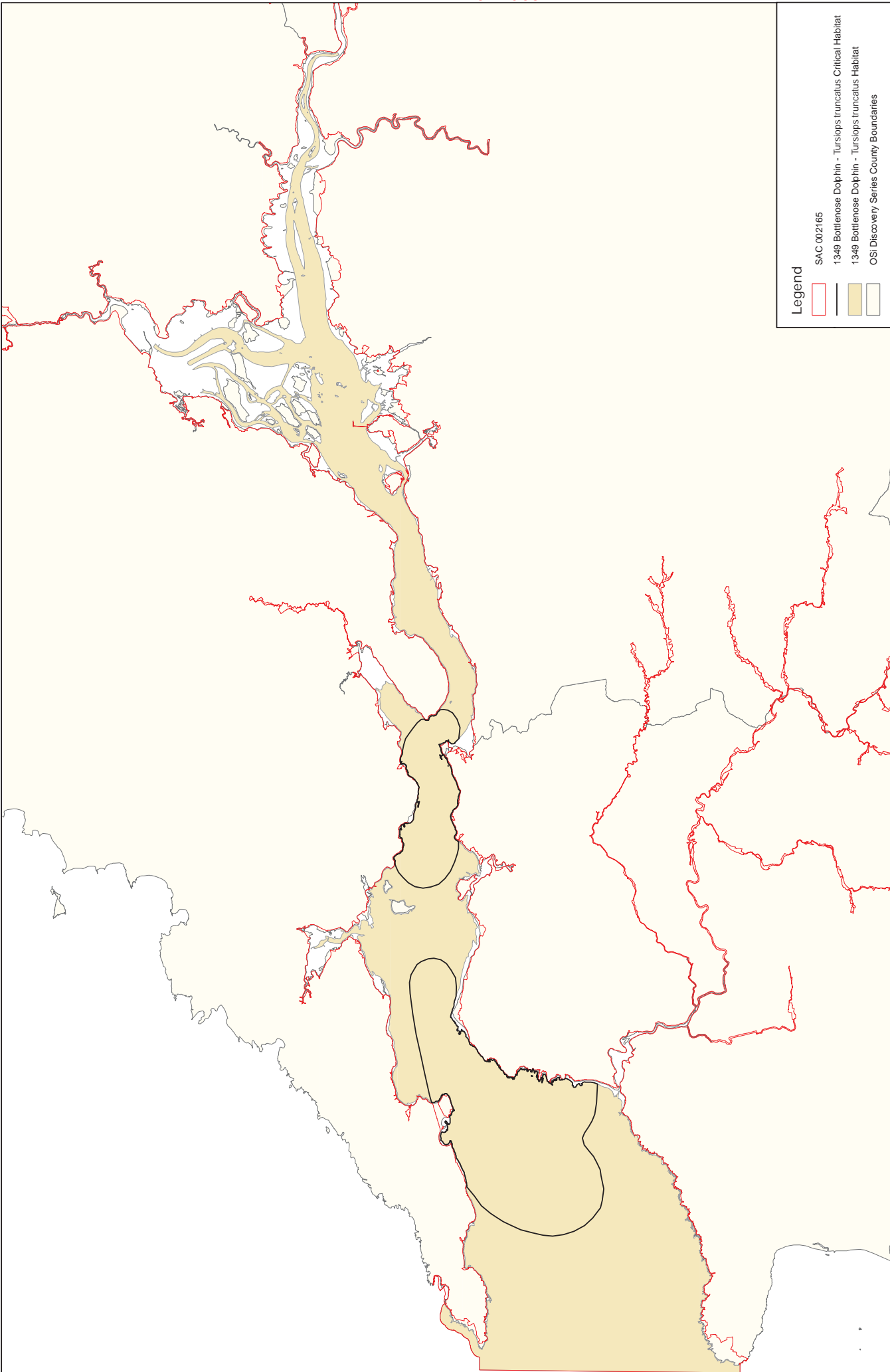
Map Version 1  
Date: June 2012

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 Níl siad teorainneacha ar na léarscálleanna ach nód gairbhíochtaí ginearálta. Feadfar athbhreithniú a déanamh ar theorainneacha na gceantar comharthaíthe. Macasamhail d'ábhar na Súrbbhéarachta Ordónais le chead na Sibbhéarachta Úrnh. EN 0059208)

SITE CODE: SAC002165  
 CO. CLARE: version 1.2, CO. CORK: version 1.01, CO. KERRY: version 1.11,  
 CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05



MAP 15:  
 LOWER RIVER SHANNON SAC  
 CONSERVATION OBJECTIVES  
 FRESHWATER PEARL MUSSEL  
 Map to be read in conjunction with the NPWS Conservation Objectives Document.

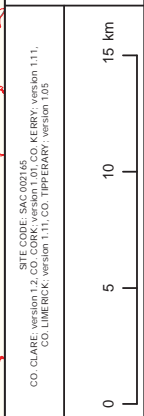


**Legend**

- SAC 002165
- 1349 Bottlenose Dolphin - Tursiops truncatus Critical Habitat
- 1349 Bottlenose Dolphin - Tursiops truncatus Habitat
- OSi Discovery Series County Boundaries

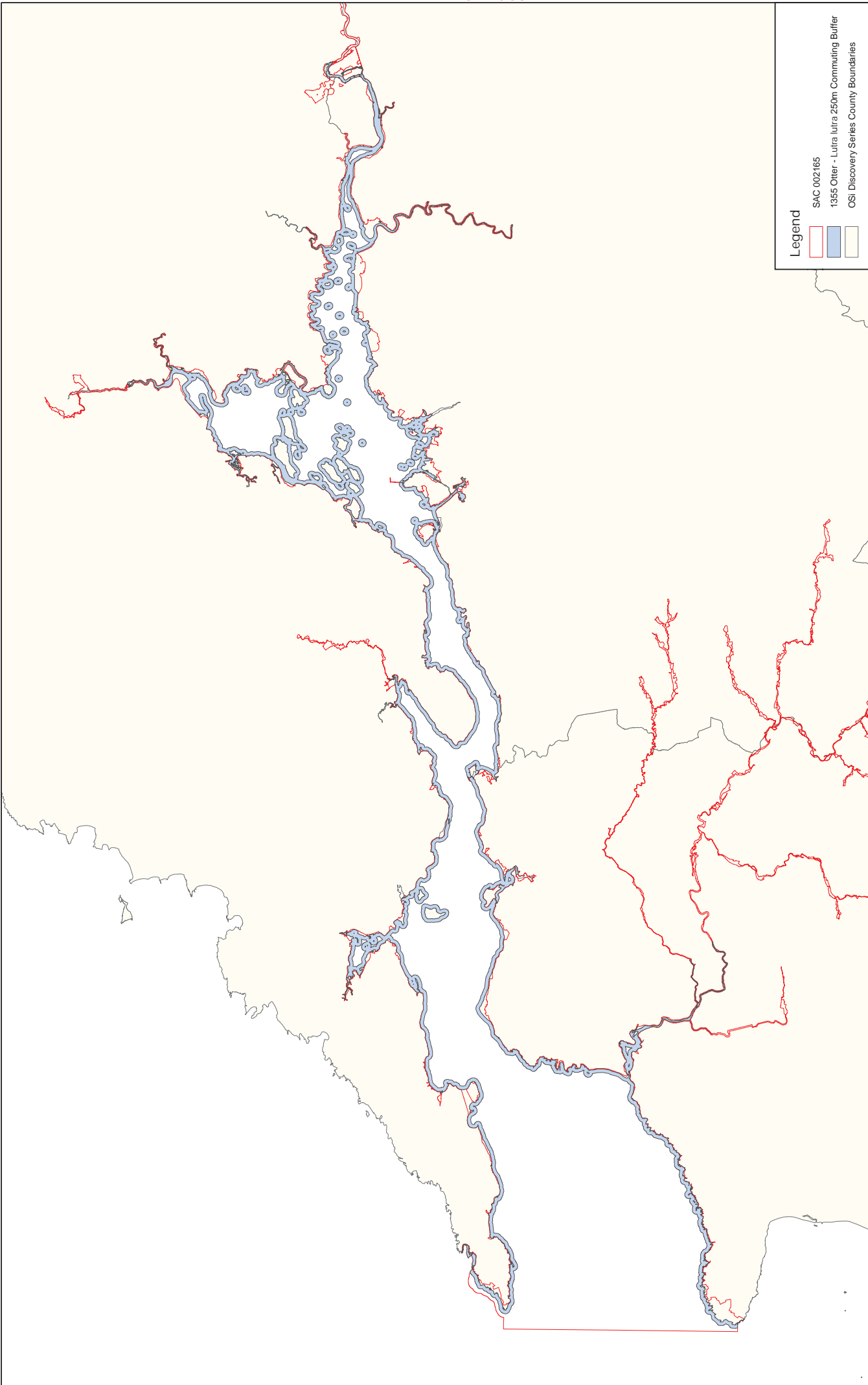
  
 Map Version 1  
 Date: June 2012

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 Níl síne teorainneacha ar na léarscálleanna ach nód garsúlómhach ginearálta. Fíleadar athbhreathnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Míceasamhail d'ábhar na Sibbhíreacha Ordónais le chead na Riailas (Ceadúnas Úmh. EN 0059208)



**MAP 16:**  
**LOWER RIVER SHANNON SAC**  
**CONSERVATION OBJECTIVES**  
**BOTTLENOSE DOLPHIN**

Map to be read in conjunction with the NPWS Conservation Objectives Document.



Legend

- SAC 002165
- 1355 Otter - Lutra lutra 250m Commuting Buffer
- OSI Discovery Series County Boundaries

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 Níl síne teorainneacha ar na léarscálleanna ach níl gáirshuíomhach ginearálta. Fíleadar athbhreithnithe a déanann ar theorainneacha na gceantar comharthaíthe. Mícaasamhail d'ábhar na Sibbhíreachtá Ordónais le chead on Riailtas (Ceadúnas Uimh. EN 0059208)

SITE CODE: SAC002165  
 CO. CLARE: version 1.2, CO. CORK: version 1.0, CO. KERRY: version 1.11,  
 CO. LIMERICK: version 1.11, CO. TIPPERARY: version 1.05



MAP 17:  
 LOWER RIVER SHANNON SAC  
 CONSERVATION OBJECTIVES  
 OTTER COMMUTING

Map to be read in conjunction with the NPWS Conservation Objectives Document.

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Lower River Suir SAC 002137



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

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Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs





**National Parks and Wildlife Service,  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs,  
7 Ely Place, Dublin 2, Ireland.  
Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

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National Parks and Wildlife Service, Department of Arts, Heritage, Regional,  
Rural and Gaeltacht Affairs.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

002137	Lower River Suir SAC
1029	Freshwater Pearl Mussel <i>Margaritifera margaritifera</i>
1092	White-clawed Crayfish <i>Austropotamobius pallipes</i>
1095	Sea Lamprey <i>Petromyzon marinus</i>
1096	Brook Lamprey <i>Lampetra planeri</i>
1099	River Lamprey <i>Lampetra fluviatilis</i>
1103	Twaite Shad <i>Alosa fallax fallax</i>
1106	Salmon <i>Salmo salar</i>
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )
1355	Otter <i>Lutra lutra</i>
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
91A0	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )*
91J0	<i>Taxus baccata</i> woods of the British Isles*

**Please note that this SAC is adjacent to River Barrow and River Nore SAC (002162). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent site as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year</b>	1998
<b>Title</b>	Conservation management of the white-clawed crayfish, <i>Austropotamobius pallipes</i>
<b>Author</b>	Reynolds, J.D.
<b>Series</b>	Irish Wildlife Manual No. 1
<b>Year</b>	2006
<b>Title</b>	Otter survey of Ireland 2004/2005
<b>Author</b>	Bailey, M.; Rochford, J.
<b>Series</b>	Irish Wildlife Manual No. 23
<b>Year</b>	2006
<b>Title</b>	Initiation of a monitoring program for the freshwater pearl mussel, <i>Margaritifera margaritifera</i> , in the Clodiagh River (Suir)
<b>Author</b>	Ross, E.
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2007
<b>Title</b>	A survey of juvenile lamprey populations in the Corrib and Suir catchments
<b>Author</b>	O'Connor, W.
<b>Series</b>	Irish Wildlife Manual No. 26
<b>Year</b>	2007
<b>Title</b>	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
<b>Author</b>	NPWS
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2008
<b>Title</b>	National survey of native woodlands 2003-2008
<b>Author</b>	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2009
<b>Title</b>	Saltmarsh monitoring project 2007-2008
<b>Author</b>	McCorry, M.; Ryle, T.
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2009
<b>Title</b>	NS II freshwater pearl mussel sub-basin management plans: monitoring of the freshwater pearl mussel in the Clodiagh
<b>Author</b>	Ross, E.
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2009
<b>Title</b>	NS II freshwater pearl mussel sub-basin management plans: fisheries survey. Stage 1 report
<b>Author</b>	Paul Johnston Associates
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2009
<b>Title</b>	NS II freshwater pearl mussel sub-basin management plans: report on biological monitoring of surface water quality in Clodiagh (Waterford) catchment
<b>Author</b>	Morgan, G.
<b>Series</b>	Unpublished report to NPWS

<b>Year</b>	2010
<b>Title</b>	A provisional inventory of ancient and long-established woodland in Ireland
<b>Author</b>	Perrin, P.M.; Daly, O.H.
<b>Series</b>	Irish Wildlife Manual No. 46
<b>Year</b>	2010
<b>Title</b>	A technical manual for monitoring white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) in Irish lakes
<b>Author</b>	Reynolds, J., O'Connor, W., O'Keeffe, C.; Lynn, D.
<b>Series</b>	Irish Wildlife Manual No.45
<b>Year</b>	2010
<b>Title</b>	Second draft Clodiagh freshwater pearl mussel sub-basin management plan (2009-2015). March 2010
<b>Author</b>	NPWS
<b>Series</b>	Unpublished document to the Department of Environment, Heritage and Local Government
<b>Year</b>	2010
<b>Title</b>	NS2 freshwater pearl mussel sub-basin management plans. Phytobenthos monitoring of the Clodiagh catchment, Co. Waterford (SERBD). June and July
<b>Author</b>	Ní Chatháin, B.
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2012
<b>Title</b>	Lower River Shannon SAC (site code: 2165) Conservation objectives supporting document- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation V1
<b>Author</b>	NPWS
<b>Series</b>	Conservation objectives supporting document
<b>Year</b>	2013
<b>Title</b>	National otter survey of Ireland 2010/12
<b>Author</b>	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
<b>Series</b>	Irish Wildlife Manual No. 76
<b>Year</b>	2013
<b>Title</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series</b>	Irish Wildlife Manual No. 78
<b>Year</b>	2013
<b>Title</b>	Results of monitoring survey of old sessile oak woods and alluvial forests
<b>Author</b>	O'Neill, F.H.; Barron, S.J.
<b>Series</b>	Irish Wildlife Manual No. 71
<b>Year</b>	2013
<b>Title</b>	Results of a monitoring survey of yew woodland
<b>Author</b>	Cross, J.; Lynn, D.
<b>Series</b>	Irish Wildlife Manual No. 72
<b>Year</b>	2013
<b>Title</b>	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
<b>Author</b>	NPWS
<b>Series</b>	Conservation assessments

<b>Year</b>	2016
<b>Title</b>	Ireland Red List No. 10: Vascular Plants
<b>Author</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series</b>	Ireland Red Lists series, NPWS
<b>Year</b>	2017
<b>Title</b>	Lower River Suir SAC (site code: 2137) Conservation objectives supporting document- coastal habitats V1
<b>Author</b>	NPWS
<b>Series</b>	Conservation objectives supporting document
<b>Year</b>	2017
<b>Title</b>	Survey and condition assessment of the freshwater pearl mussel, <i>Margaritifera margaritifera</i> (L.), in the Clodiagh River (Suir, Portlaw)
<b>Author</b>	Ross, E.; Moorkens, E.; Killeen, I.
<b>Series</b>	Unpublished report to NPWS

## Other References

<b>Year</b>	1898
<b>Title</b>	Contributions towards a Cybele Hibernica. Second Edition
<b>Author</b>	Colgan, N.; Scully, R.W.
<b>Series</b>	Edward Ponsonby, Dublin
<b>Year</b>	1982
<b>Title</b>	Otter survey of Ireland
<b>Author</b>	Chapman, P.J.; Chapman, L.L.
<b>Series</b>	Unpublished report to Vincent Wildlife Trust
<b>Year</b>	1988
<b>Title</b>	The reproductive biology of freshwater mussels in Ireland, with observations on their distribution and demography
<b>Author</b>	Ross, E.D.
<b>Series</b>	Unpublished Ph.D. Thesis, National University of Ireland, Galway
<b>Year</b>	1991
<b>Title</b>	The spatial organization of otters ( <i>Lutra lutra</i> ) in Shetland
<b>Author</b>	Kruuk, H.; Moorhouse, A.
<b>Series</b>	Journal of Zoology, 224: 41-57
<b>Year</b>	1992
<b>Title</b>	Status of the freshwater pearl mussels <i>Margaritifera margaritifera</i> and <i>Margaritifera emarginata</i> in the Nore, Barrow and Suir River tributaries, south-east Ireland
<b>Author</b>	Moorkens, E.A.; Costello, M.J.; Speight, M.C.D.
<b>Series</b>	Irish Naturalists' Journal, 24(3): 127-131
<b>Year</b>	1996
<b>Title</b>	Studies on the biology and ecology of <i>Margaritifera</i> in Ireland
<b>Author</b>	Moorkens, E.
<b>Series</b>	Unpublished Ph.D. thesis, University of Dublin, Trinity College.
<b>Year</b>	1999
<b>Title</b>	Diet of otters ( <i>Lutra lutra</i> ) on Inishmore, Aran Islands, west coast of Ireland
<b>Author</b>	Kingston, S.; O'Connell, M.; Fairley, J.S.
<b>Series</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 99B: 173-182

<b>Year</b>	2001
<b>Title</b>	Aquatic plants in Britain and Ireland
<b>Author</b>	Preston, C.D.; Croft, J.M.
<b>Series</b>	Harley Books, Colchester
<b>Year</b>	2002
<b>Title</b>	Reversing the habitat fragmentation of British woodlands
<b>Author</b>	Peterken, G.
<b>Series</b>	WWF-UK, London
<b>Year</b>	2002
<b>Title</b>	A survey of the white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) Lereboullet and of water quality in two catchments of eastern Ireland
<b>Author</b>	Demers, A.; Reynolds, J.D.
<b>Series</b>	Bulletin Francais de la Peche et de la Pisciculture, 367: 729-740
<b>Year</b>	2003
<b>Title</b>	Monitoring the river, sea and brook lamprey, <i>Lampetra fluviatilis</i> , <i>L. planci</i> and <i>L. trutta</i>
<b>Author</b>	Harvey, J.; Cowx, I.
<b>Series</b>	Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
<b>Year</b>	2003
<b>Title</b>	Ecology of watercourses characterised by Ranunculion fluitantis and Callitriche-Batrachion Vegetation
<b>Author</b>	Hatton-Ellis, T.W.; Grieve, N.
<b>Series</b>	Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough
<b>Year</b>	2003
<b>Title</b>	Ecology of the allis and twaite shad
<b>Author</b>	Maitland, P.S.; Hatton-Ellis, T.W.
<b>Series</b>	Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough
<b>Year</b>	2003
<b>Title</b>	Pondweeds of Great Britain and Ireland
<b>Author</b>	Preston, C.D.
<b>Series</b>	BSBI Handbook, No. 8, London
<b>Year</b>	2003
<b>Title</b>	Identifying lamprey. A field key for sea, river and brook lamprey
<b>Author</b>	Gardiner, R.
<b>Series</b>	Conserving Natura 2000 rivers, Conservation techniques No. 4. English Nature, Peterborough
<b>Year</b>	2006
<b>Title</b>	Otters - ecology, behaviour and conservation
<b>Author</b>	Kruuk, H.
<b>Series</b>	Oxford University Press
<b>Year</b>	2006
<b>Title</b>	The status of host fish populations and fish species richness in European freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) streams
<b>Author</b>	Geist, J.; Porkka, M.; Kuehn, R.
<b>Series</b>	Aquatic Conservation: Marine and Freshwater Ecosystems, 16: 251-266
<b>Year</b>	2007
<b>Title</b>	Evolutionary history of lamprey paired species <i>Lampetra fluviatilis</i> L. and <i>Lampetra planci</i> Bloch as inferred from mitochondrial DNA variation
<b>Author</b>	Espanhol, R.; Almeida, P.R.; Alves, M.J.
<b>Series</b>	Molecular Ecology, 16: 1909-1924

<b>Year</b>	2008
<b>Title</b>	Poor water quality constrains the distribution and movements of twaite shad ( <i>Alosa fallax fallax</i> , Lacepede, 1803) in the watershed of river Scheldt
<b>Author</b>	Maas, J.; Stevens, M.; Breine, J.
<b>Series</b>	Hydrobiologia, 602: 129-143
<b>Year</b>	2008
<b>Title</b>	Flora of County Waterford
<b>Author</b>	Green, P.
<b>Series</b>	The National Botanic Gardens of Ireland, Dublin
<b>Year</b>	2010
<b>Title</b>	Otter tracking study of Roaringwater Bay
<b>Author</b>	De Jongh, A.; O'Neill, L.
<b>Series</b>	Unpublished draft report to NPWS
<b>Year</b>	2010
<b>Title</b>	Addressing the conservation and rehabilitation of <i>Margaritifera margaritifera</i> populations in the Republic of Ireland within the framework of the habitats and species directive
<b>Author</b>	Moorkens, E.
<b>Series</b>	Journal of Conchology, 40: 339
<b>Year</b>	2011
<b>Title</b>	Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland
<b>Author</b>	Gargan, P.G.; Roche, W.K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.
<b>Series</b>	Journal of Applied Ichthyology, 27 (Suppl. 3): 66-72
<b>Year</b>	2012
<b>Title</b>	Rare and threatened bryophytes of Ireland
<b>Author</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series</b>	National Museums Northern Ireland
<b>Year</b>	2013
<b>Title</b>	Aspects of brook lamprey ( <i>Lampetra planeri</i> Bloch) spawning in Irish waters
<b>Author</b>	Rooney, S.M.; O'Gorman, N.M.; Green, F.; King, J.J.
<b>Series</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 113B(1): 13-25
<b>Year</b>	2013
<b>Title</b>	Management strategies for the protection of high status water bodies
<b>Author</b>	Ní Chatháin, B.; Moorkens, E.; Irvine, K.
<b>Series</b>	Strive Report Series No. 99. EPA, Wexford
<b>Year</b>	2013
<b>Title</b>	Interpretation manual of European Union habitats- Eur 28
<b>Author</b>	European Commission- DG Environment
<b>Series</b>	European Commission
<b>Year</b>	2014
<b>Title</b>	Assessing near-bed velocity in a recruiting population of the endangered freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) in Ireland
<b>Author</b>	Moorkens, E.; Killeen, I.
<b>Series</b>	Aquatic Conservation: Marine and Freshwater Ecosystems, 24(6): 853-862



<b>Year</b>	2015
<b>Title</b>	Water quality in Ireland 2010-2012
<b>Author</b>	Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.
<b>Series</b>	EPA, Wexford
<b>Year</b>	2015
<b>Title</b>	Behaviour of sea lamprey ( <i>Petromarinus</i> L.) at man-made obstacles during upriver spawning migration: use of telemetry to access efficacy of weir modifications for improved passage
<b>Author</b>	Rooney, S.M.; Wightman, G.D.; O Conchuir, R.; King, J.J.
<b>Series</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 115B: 1-12
<b>Year</b>	2015
<b>Title</b>	River engineering works and lamprey ammocoetes; impacts, recovery, mitigation
<b>Author</b>	King, J.J.; Wightman, G.D.; Hanna, G.; Gilligan, N.
<b>Series</b>	Water and Environment Journal, 29: 482-488
<b>Year</b>	2016
<b>Title</b>	A narrative for conserving freshwater and wetland habitats in England
<b>Author</b>	Mainstone, C.; Hall, R.; Diack, I.
<b>Series</b>	Natural England Research Reports Number 064
<b>Year</b>	2016
<b>Title</b>	The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016
<b>Author</b>	SSCS (Standing Scientific Committee on Salmon)
<b>Series</b>	Independent Scientific Report to Inland Fisheries Ireland
<b>Year</b>	Undated
<b>Title</b>	WFD111 (2a) Coarse resolution rapid-assessment methodology to assess obstacles to fish migration: Field manual level A assessment
<b>Author</b>	SNIFFER (Scotland and Northern Ireland Forum for Environmental Research)
<b>Series</b>	SNIFFER WFD111

## Spatial data sources

<b>Year</b>	Revision 2010
<b>Title</b>	Saltmarsh Monitoring Project 2007-2008. Version 1
<b>Site operations</b>	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Site ID</b>	1330, 1410 (map 3)
<b>Year</b>	Revision 2010
<b>Title</b>	National Survey of Native Woodlands 2003-2008. Version 1
<b>Site operations</b>	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Site ID</b>	91A0, 91E0 (maps 4 and 5)
<b>Year</b>	Revision 2012
<b>Title</b>	Margaritifera Sensitive Areas data
<b>Site operations</b>	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
<b>Site ID</b>	1029 (map 6)
<b>Year</b>	2016
<b>Title</b>	NPWS rare and threatened species database
<b>Site operations</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Site ID</b>	1029, 1092 (maps 6 and 7)
<b>Year</b>	2010
<b>Title</b>	EPA WFD Waterbodies data
<b>Site operations</b>	Creation of 20m buffer to river and stream centreline data. Dataset combined with derived OSi data for 1355 SSCO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Site ID</b>	1355 (no map)
<b>Year</b>	2005
<b>Title</b>	OSi Discovery series vector data
<b>Site operations</b>	Creation of 80m buffer on the marine side of high water mark (HWM); creation of 10m buffer on terrestrial side of HWM; combination of 80m and 10m HWM buffer datasets. Datasets combined with derived EPA WFD Waterbodies data for 1355 SSCO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Site ID</b>	1355 (no map)

**Conservation Objectives for : Lower River Suir SAC [002137]**

**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

**To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the sub-site (Little Island) and potential areas mapped: 33.43ha. See map 3	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). The sub-site Little Island (SMP site ID: SMP0052) that supports Atlantic Salt Meadows (ASM) was mapped during the SMP (4.11ha) and additional areas of potential ASM habitat (29.32ha) were identified from an examination of aerial photographs, giving a total estimated area of 33.43ha within Lower River Suir SAC. NB further unsurveyed areas may be present within the SAC. See the Lower River Suir SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 3 for known and potential distribution	Based on data from McCorry and Ryle (2009). Saltmarsh occurs on the River Suir estuary downstream of Waterford City in old flood meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing channels below Little Island. NB further unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Little Island saltmarsh contains a well-developed topography and large, deep creeks are present. See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Based on data from McCorry and Ryle (2009). Much of the shoreline along the Lower River Suir channel has been modified by embankments, infilling and drainage. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). There are several saltmarsh communities present and zonation is moderately well-developed in the sub-site surveyed. The ASM transitions to grassland and freshwater habitats. This is typical of an estuary type saltmarsh with a significant freshwater influence. See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). As the sub-site is not grazed, the sward height is lush and rank in places. However, the overall sward structure is still quite variable. See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in McCorry and Ryle (2009)	See the coastal habitats supporting document for further details

REFERENCE DOCUMENT

Vegetation composition: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1% where it is known to occur	Based on data from McCorry and Ryle (2009). Common cordgrass ( <i>Spartina anglica</i> ) is present in the SAC, but swards are not a significant feature. See the coastal habitats supporting document for further details
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## Conservation Objectives for : Lower River Suir SAC [002137]

### 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

**To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession	Mediterranean Salt Meadows (MSM) habitat was not recorded in Lower River Suir SAC during the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Thus the total area of the qualifying habitat in the SAC is unknown. An NPWS survey in the 1990s noted stands of sea rush ( <i>Juncus maritimus</i> ), indicative of MSM, on the saltmarsh at Grantstown (NPWS internal files), but the habitat was not recorded in the Little Island sub-site during the SMP in 2007 (McCorry and Ryle, 2009). NB unsurveyed areas may be present within the SAC. See the Lower River Suir SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes	See note on area above. NB unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Attribute and target based on data from McCorry and Ryle (2009). Mediterranean salt meadow habitat is found high up in the saltmarsh but requires occasional tidal inundation. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation in the sward	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with characteristic species listed in McCorry and Ryle (2009)	See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1% where it is already known to occur	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details

## Conservation Objectives for : Lower River Suir SAC [002137]

### **3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**

**To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The description of habitat 3260 covers upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. The selection of Lower River Suir SAC used this broad interpretation. Conservation objectives for habitat 3260 concentrate on the high conservation value sub-types, however, little is known of the habitat's distribution or its sub-types in Lower River Suir SAC. There is a large number of lowland and tidal rivers in the SAC, as well as faster-flowing tributaries. Note: rooted macrophytes should be absent or trace (<5% cover) in freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Clodiagh River (Portlaw) within this SAC, because the mussel requires environmental conditions close to natural background levels
Habitat distribution	Occurrence	No decline, subject to natural processes	Further study is needed of Irish sub-types and their conservation value to interpret the broad description of habitat 3260 (European Commission, 2013). As noted above, little is known about the distribution of the habitat and its sub-types in Lower River Suir SAC. The uncommon, protected opposite-leaved pondweed ( <i>Groenlandia densa</i> ) was recorded in the SAC from floodplain ditches of the Suir near Carrick-on-Suir and Clonmel, as well as the Clodiagh near Portlaw (Colgan and Scully, 1898; NPWS internal files). See NPWS (2012) for information on the requirements of opposite-leaved pondweed. There are no known records for rare or threatened bryophytes from the rivers in the SAC (Lockhart et al., 2012). The rivers in the SAC are mainly lowland, depositing and tidal, and are likely dominated by marginal and submerged higher plants. Some fast-flowing rivers also occur that should, naturally, be dominated by macroalgae and bryophytes, with limited submerged or emergent higher plants
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	High conservation value sub-types are associated with natural hydrology. A natural flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For many sub-types, high flows are required to maintain the substratum necessary for the characteristic species. Flow variation can be particularly important, with high and flood flows being critical to the hydromorphology. Other aspects of hydrology, such as tidal regime, are important for certain sub-types of the habitat. The rivers in the SAC vary from naturally flashy, through depositing to tidal reaches
Hydrological regime: groundwater discharge	Metres per second	Maintain appropriate hydrological regime	Even small groundwater contributions can significantly alter hydrochemistry, particularly where there is basic bedrock and/or subsoils. Freshwater seepages can be very important in tidal reaches

Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	Opposite-leaved pondweed ( <i>Groenlandia densa</i> ) is typical of the tidal reaches of large Irish rivers, e.g. Suir, Slaney, Shannon and Blackwater (see Preston and Croft, 2001; Preston, 2003). This species is listed as Near Threatened (Wyse Jackson et al., 2016) and is protected on the Flora (Protection) Order, 2015 (Statutory Instrument No. 356 of 2015). Both the disturbance and substratum associated with the tidal regime may be important drivers
Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	Many of the high conservation value sub-types are dominated by coarse substrata, and it is likely that bedrock, boulders, cobbles and coarse gravels were naturally abundant in many tributaries in this SAC, particularly where the freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) occurred. Fine substrata are naturally abundant in depositing and tidal reaches. The size and distribution of particles are largely determined by the river flow. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver of rooted plant communities. Note: increased fine sediment is contributing to the unfavourable status of the freshwater pearl mussel in the Clodiagh. See the freshwater pearl mussel (1029) conservation objective
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The specific targets may vary among sub-types. Depositing and tidal stretches of rivers may, naturally, be more nutrient-rich and, therefore Water Framework Directive (WFD) good status may suffice in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos. Faster-flowing tributaries that are naturally dominated by bryophytes and macroalgae typically require WFD high status. High status targets apply to freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) habitat in the Clodiagh (see The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 - S.I. No. 296 of 2009). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), Environmental Protection Agency (EPA) river water quality reports (e.g. Bradley et al., 2015) and Ní Chatháin et al. (2013)
Typical species	Occurrence	Maintain typical species in good condition, including appropriate distribution and abundance	The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined. The typical species may include higher plants, bryophytes, macroalgae and microalgae, and invertebrates. As noted above, the protected vascular plant species opposite-leaved pondweed ( <i>Groenlandia densa</i> ) is associated with rivers and floodplains in the SAC. The banks of the Suir, particularly its tidal stretches, support a notable population of the rare <i>Rumex crispus</i> subsp. <i>uliginosus</i> (Green, 2008)
Floodplain connectivity	Hectares	Maintain floodplain connectivity necessary to support the typical species and vegetation composition of the habitat	River connectivity with the floodplain is important for the functioning of this habitat. Channels with a naturally functioning floodplain are better able to maintain habitat and water quality (Hatton-Ellis and Grieve, 2003). Floodplain connectivity is particularly important in terms of sediment sorting and nutrient deposition. High conservation value rivers are intimately connected to floodplain habitats and function as important wildlife corridors, connecting otherwise isolated or fragmented habitats in the wider countryside (Hatton-Ellis and Grieve, 2003; Mainstone et al., 2016). Alluvial woodland (91E0) is an important feature of rivers in Lower River Suir SAC (see the conservation objective for 91E0)

Fringing habitats	Hectares	Maintain marginal fringing habitats that support the typical species and vegetation composition of the habitat	Riparian habitats (including those along lake shores), particularly natural/semi-natural woodlands and wetlands, are an integral part of the structure and functioning of river systems, even where they do not form part of a natural floodplain. Fringing habitats can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates, assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling. Shade may also be important in suppressing algal growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. See Mainstone et al. (2016). Alluvial and riparian woodland is important for the rivers in Lower River Suir SAC
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## Conservation Objectives for : Lower River Suir SAC [002137]

### **6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels**

**To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat in the SAC is unknown. The lowland type communities of the habitat are considered to occur in association with the various areas of alluvial forest (91E0) within the SAC, notably at Fiddown, below Carrick-on-Suir and at Tibberaghny Marshes. This habitat type would also be expected to occur in association with other woodland types in fringe areas along the river and with areas of open marsh or wet grassland within the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes on area above
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regime	This habitat requires winter inundation, which results in deposition of naturally nutrient-rich sediment
Vegetation composition: positive indicator species	Number of species at a representative number of monitoring stops	At least three positive indicator species present	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species is also presented
Vegetation composition: positive indicator species	Percentage cover at a representative number of monitoring stops	Cover of positive indicator species at least 40%	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species is also presented
Vegetation composition: non-native species	Percentage cover at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013). The spread of Japanese knotweed ( <i>Fallopia japonica</i> ) is noted as a threat at Tibberaghny (NPWS internal files)
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Cover of negative indicator species not more than 33%	Attribute and target based on O'Neill et al. (2013), where the list of negative indicator species is also presented
Vegetation composition: scrub, bracken and heath	Percentage at a representative number of monitoring stops	Cover of scrub, bracken ( <i>Pteridium aquilinum</i> ) and heath not more than 5%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: height	Height (centimetres) at a representative number of monitoring stops	Herb height at least 50cm	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Cover of bare soil not more than 10%	Attribute and target based on O'Neill et al. (2013)
Physical structure: grazing and disturbance	Square metres in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013)

**Conservation Objectives for : Lower River Suir SAC [002137]**

**91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles**

**To restore the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 29.3ha for sites surveyed. See map 4	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> were surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Lyranearla (NSNW site code: 1834) and Inchinsquillib Wood (NSNW site code: 1898). The area of old oak woodlands in the surveyed sites within the SAC is estimated to be 29.3ha. It is important to note that further unsurveyed areas are present within the SAC, including at Portlaw Wood within the Curraghmore Estate and other small pockets within the SAC (NPWS internal files). Map 4 shows the old oak woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 4	Distribution shown based on Perrin et al. (2008). NB further unsurveyed areas are present within this SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak ( <i>Quercus petraea</i> ) generally regenerates poorly. In suitable sites, ash ( <i>Fraxinus excelsior</i> ) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-listed and other rare or localised species. The rare lichen tree lungwort ( <i>Lobaria pulmonaria</i> ), an indicator of ancient woodlands, is found in Portlaw Wood (NPWS internal files)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files

Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak ( <i>Quercus petraea</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Rhododendron ( <i>Rhododendron ponticum</i> ) infestation at Portlaw Wood is noted as being serious, as well as the occurrence of beech ( <i>Fagus sylvatica</i> ), sycamore ( <i>Acer pseudoplatanus</i> ) and silver fir ( <i>Abies alba</i> ) in the woodland (NPWS internal files). Beech was reported from Lyranearla (NSNW site code: 1834) by Perrin et al. (2008)

## Conservation Objectives for : Lower River Suir SAC [002137]

### 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

**To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)\* in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 32.9ha for sites surveyed. See map 5	Alluvial forest was surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Fiddown (NSNW site code: 0022), Mountbolton (NSNW site code: 1823) and Ballycanvan Big (NSNW site code: 1839). Fiddown (0022) was also included in a national monitoring survey (O'Neill and Barron, 2013). The area of alluvial woodlands in the surveyed sites within the SAC is estimated to be 32.9ha. It is important to note that further unsurveyed areas of alluvial forest are present within the SAC, for example at islands below Carrick-on-Suir, at Shanbally (Coillte LIFE project site), Tibberaghny Marshes, along the lower stretches of the more westerly of the Suir tributaries and along both banks of the Suir as far east as the Dawn River (NPWS internal files). Map 5 shows the alluvial woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 5	Distribution shown based on Perrin et al. (2008). NB further unsurveyed areas are present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder ( <i>Alnus glutinosa</i> ) and oak ( <i>Quercus</i> spp.) tend to regenerate poorly. Ash ( <i>Fraxinus excelsior</i> ) often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains, but not for woodland around springs/seepage areas
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder ( <i>Alnus glutinosa</i> ))	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) identify the site Ballycanvan Big (NSNW site code: 1839) as being "possible ancient woodland"
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder ( <i>Alnus glutinosa</i> ), willows ( <i>Salix</i> spp.), oak ( <i>Quercus</i> spp.), ash ( <i>Fraxinus excelsior</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Norway spruce ( <i>Picea abies</i> ) and sycamore ( <i>Acer pseudoplatanus</i> ) occur at Shanbally (NPWS internal files). Spread of Japanese knotweed ( <i>Fallopia japonica</i> ) is a problem at Tibberaghny (NPWS internal files). Cherry laurel ( <i>Prunus laurocerasus</i> ) and rhododendron ( <i>Rhododendron ponticum</i> ) have been reported as occurring in part of Ballycanvan Big (NSNW site code: 1839) by Perrin et al. (2008), but not within the alluvial woodland

## Conservation Objectives for : Lower River Suir SAC [002137]

### 91J0 *Taxus baccata* woods of the British Isles

**To restore the favourable conservation condition of *Taxus baccata* woods of the British Isles\* in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	<i>Taxus baccata</i> woods of the British Isles habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat is unknown. Yew ( <i>Taxus baccata</i> ) woodland is known to occur at Cahir Park in an area of c.500m by 50m. Cahir Park was included in a national monitoring survey of yew woodland (Cross and Lynn, 2013). NB further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline	A narrow stand of yew woodland occurs along the steep western flank of a limestone knoll at Cahir Park within Lower River Suir SAC. See Cross and Lynn (2013) for further details. NB further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing	Yew ( <i>Taxus baccata</i> ) has been planted on deeper soil on top of the knoll at Cahir Park. If the transplants survive, the area of yew woodland will be considerably expanded. See Cross and Lynn (2013) for further details
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and herb and bryophyte layer	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yew ( <i>Taxus baccata</i> ) regenerates poorly under its own canopy but can regenerate under a canopy of other species or in the open if the competition from the field layer is not too strong
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-data and other rare or localised species
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Vegetation composition: typical species	Occurrence	A variety of typical native species present, including yew ( <i>Taxus baccata</i> ) and ash ( <i>Fraxinus excelsior</i> )	See Perrin et al. (2008) and Cross and Lynn (2013) for further details

Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The most common invasive species in this woodland type is beech ( <i>Fagus sylvatica</i> ), although there is evidence to suggest that it actually facilitates regeneration of yew ( <i>Taxus baccata</i> ). Numerous exotic species, including cherry laurel ( <i>Prunus laurocerasus</i> ) in particular, have been reported from Cahir Park (Cross and Lynn, 2013)
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**Conservation Objectives for : Lower River Suir SAC [002137]**

**1029 Freshwater Pearl Mussel *Margaritifera margaritifera***

**To restore the favourable conservation condition of Freshwater Pearl Mussel in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Kilometres	Restore distribution to 10.4km. See map 6	The conservation objective applies to the Clodiagh freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) population, which is listed on The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. (S.I. 296 of 2009). Full baseline distribution and abundance mapping was conducted in 2006 (Ross, 2006). Mussel habitat is widespread in the Clodiagh, with mussels almost continually present in low numbers from downstream of Clonea to above Portlaw (Ross, 2006). Mussels were nowhere abundant; maximum density was 3 per square metre (Ross, 2006). The habitat is significantly below carrying-capacity. The distribution in the Clodiagh has contracted since the 1990s (Ross, 2006). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Clodiagh system. See NPWS (2010) for further information
Population size	Number of adult mussels	Restore population to at least 10,000 adult mussels	Ross (2006) counted 1,206 mussels and estimated a total population of 2,412, concluding that, given the large areas of physically suitable habitat, a much larger population was previously present and a major population decline had occurred. Ross (2009) measured an 18.5% decline in mussel numbers between 2006 and 2009 at transect 1, indicating continued losses. Ross et al. (2017) recorded 'rapid and alarming' declines of 56-94% between 2006 and 2016 at five monitoring locations (67% decline overall). Moorkens (2010) estimated the population to be less than 10,000. The target of 10,000 is considered appropriate for a functional, self-sustaining population. NPWS (2013), in producing a national population estimate, assumed the Clodiagh population had declined at a rate of 3% per year. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Clodiagh system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of each population no more than 65mm in length; and at least 5% of each population no more than 30mm in length	Mussels ≤65mm are 'young mussels' and found buried in the substratum or beneath adult mussels. Mussels ≤30mm are 'juvenile mussels' and always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The Clodiagh failed both targets in 2006, 2009 and 2016 (Ross, 2006, 2009; NPWS, 2010; Ross et al., 2017). Ross (2006) found no juveniles, ≤65mm extremely uncommon, smallest individual was 45.4mm and 97% was >80mm. In 2009, the smallest mussel was 78mm and (based on Ross, 1988) 15-20 years old (Ross, 2009). The smallest of 21 mussels measured in 1986 was 48.6mm (Ross, 1988). NPWS (2010) concluded there had been no successful recruitment from 1986 to 2009. The Clodiagh population is considered to be unsustainable owing to lack of survival of juvenile and adult mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system



Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. The Clodiagh failed both targets in 2009 (Ross, 2009; NPWS, 2010) and, as noted above, a major population decline has occurred (Ross, 2006; Ross et al., 2017), and is presumed to be on-going. In 2009, 1 transect and 1 delimited count were counted: T1 numbers had fallen from 27 in 2006 to 22, representing a 18.5% decline, while numbers were the same in C2. Seven dead shells were found among 23 live mussels at one location, indicating high mortality in parts of the Clodiagh. In 2016, 67 mussels were counted at five monitoring sites that had 205 mussels in 2006 (Ross et al., 2017). The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 8.8km in the Clodiagh system and any additional stretches necessary for salmonid spawning	Mussel habitat in the Clodiagh is known to occur from Clonea to Portlaw, and is sparsely occupied from c.630m downstream of Clonea to c.1.8km above Portlaw (Ross, 2006). Mussels were recorded at Portlaw as recently as the 1990s and downstream of Portlaw in the early 20th century. It is possible that some mussel habitat occurs upstream or downstream of the mapped stretches, but few mussels are likely to be found (Ross, 2006). The mussel habitat has been severely impacted for a significant period by sedimentation, other hydromorphological changes, organic pollution and eutrophication (NPWS, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The species' habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Availability of mussel and fish habitat is determined by flow and substratum conditions. It is highly sensitive to hydromorphological changes, sedimentation and enrichment. Pressures throughout the catchment contribute to such impacts. Mussel habitat is widespread in the Clodiagh but in unfavourable condition owing to sedimentation, other hydro-morphological changes and nutrient enrichment. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality - macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	The EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). In 2009, the habitat in the Clodiagh system failed the macroinvertebrate target, but passed the phytobenthos target (Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). Q values in the mussel habitat were Q3-Q4 (Morgan, 2009). There has been a gradual decline in quality at several main-channel sites since the late 1970s (Morgan, 2009). Sewage discharge at Clonea is impacting water quality downstream of Clonea Bridge (Ross, 2006; Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality - filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The Clodiagh failed the macrophyte target, but marginally passed the macroalgal target in 2009 (NPWS, 2010). Patches of abundant <i>Ranunculus</i> were recorded by all surveyors, with up to 40% cover in places (Morgan, 2009; Ross, 2009; Ní Chatháin, 2010; NPWS, 2010). Ross (2006) also recorded widespread and, in places, abundant (up to 80%) <i>Ranunculus</i> . Algae were generally absent in 2009, however up to 10% <i>Cladophora</i> cover was recorded downstream of Clonea Bridge (Ní Chatháin, 2010; NPWS, 2010), where sewage fungus had previously been recorded (Ross, 2006). Algae were also sparse in 2006 and 2016 (Ross, 2006; Ross et al., 2017). Tree shade may be suppressing plant growth over much of the mussel habitat (Ross et al., 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: sediment	Occurrence	Restore substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The Clodiagh failed the target for the Sub-basin Management Plan in 2009 and 2016, with strong silt plumes recorded in mussel habitat (Ross, 2009; NPWS, 2010; Ross et al., 2017). Ross et al. (2017) recorded extremely heavy silt plumes at every site, even in fast riffles. Ross (2006) recorded significant siltation of the mussel habitat and observed river bank erosion and collapse, and livestock entry to the river. Silt in the Clodiagh is providing a rooting medium for macrophytes. Sufficient survival of juvenile and adult mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Average redox was very poor, 23-28% at four sites monitored in 2016, only three of the 40 measurements was <20% (Ross et al., 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Hydrological regime: flow variability	Metres per second	Maintain appropriate hydrological regime	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other key factor). To restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediment or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle; see Moorikens and Killeen (2014). Groundwater inflow to the substratum contributes to water-cycling. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of Clodiagh system
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for mussels and a lack of mussel recruitment, while significantly lower host fish density and biomass were associated with high juvenile mussel numbers. Fish movements must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. No glochidia were found on young Clodiagh fish in May 2009, although six trout and 38 salmon were caught (Johnston, 2009; NPWS, 2010)
Fringing habitat: area and condition	Hectares	Restore the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, particularly natural/semi-natural woodlands and wetlands, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats aid in the settlement of fine suspended matter, protect banks from erosion, contribute to nutrient cycling and to the aquatic food web (e.g. allochthonous matter such as leaf fall) and provide habitat for life-stages of fish, birds and aquatic invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers (e.g. along parts of the Clodiagh) and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

**Conservation Objectives for : Lower River Suir SAC [002137]****1092 White-clawed Crayfish *Austropotamobius pallipes***

**To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	Occurrence	No reduction from baseline. See map 7	White-clawed crayfish ( <i>Austropotamobius pallipes</i> ) occurs extensively on the River Suir and on many of its tributaries. On the River Suir main channel, the species has been recorded on almost the entire length of non-tidal river from the most upstream point at Cabragh, near Thurles, to downstream of Kilsheelan. It is also present on the following tributaries: Anner and Clashawley, Clodiagh and Owenbeg, Multeen, Tar, Nier, and Clodiagh Lower
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as a major direct threat to this species and as a disease vector. Ireland is currently free of non-native invasive crayfish species. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as a major threat and crayfish plague has occurred in Ireland even in the absence of alien vectors. Disease can, in some circumstances, be introduced through contaminated equipment and water in the absence of vector species. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No reduction in habitat heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus, such as leaf litter. These conditions must be available on the whole length of occupied habitat

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1095 Sea Lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). Float-over surveys by Inland Fisheries Ireland (IFI) point to little success of sea lamprey adults in passing the weirs in Clonmel in Lower River Suir SAC. Modifications to these weirs would facilitate upstream passage of sea lamprey. IFI has embarked on a programme of detailed survey of major barriers in SAC catchments, in the context of sea lamprey passage, using the SNIFFER (Scotland and Northern Ireland Forum for Environmental Research) WFDIII methodology
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Lampreys spawn in clean gravels. Substantial areas of suitable spawning habitat are available from Cahir to Carrick-on-Suir, but access to areas upstream of Clonmel is problematic
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

**Conservation Objectives for : Lower River Suir SAC [002137]****1096 Brook Lamprey *Lampetra planeri***

**To restore the favourable conservation condition of Brook Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to lampreys' migration both up- and downstream, thereby possibly limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Brook lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally (Rooney et al., 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

**Conservation Objectives for : Lower River Suir SAC [002137]****1099 River Lamprey *Lampetra fluviatilis***

**To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block river lampreys' migration both up- and downstream, thereby limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). River lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally in numbers (Rooney et al., 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

**Conservation Objectives for : Lower River Suir SAC [002137]****1103 Twaite Shad *Alosa fallax fallax***

**To restore the favourable conservation condition of Twaite Shad in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	In some catchments, artificial barriers block twaite shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Population structure: age classes	Number of age classes	More than one age class present	
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning habitats	
Water quality: oxygen levels	Milligrams per litre	No lower than 5mg/l	Attribute and target based on Maas et al. (2008)
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	See Maitland and Hatton-Ellis (2003) for further information



**Conservation Objectives for : Lower River Suir SAC [002137]****1106 Salmon *Salmo salar***

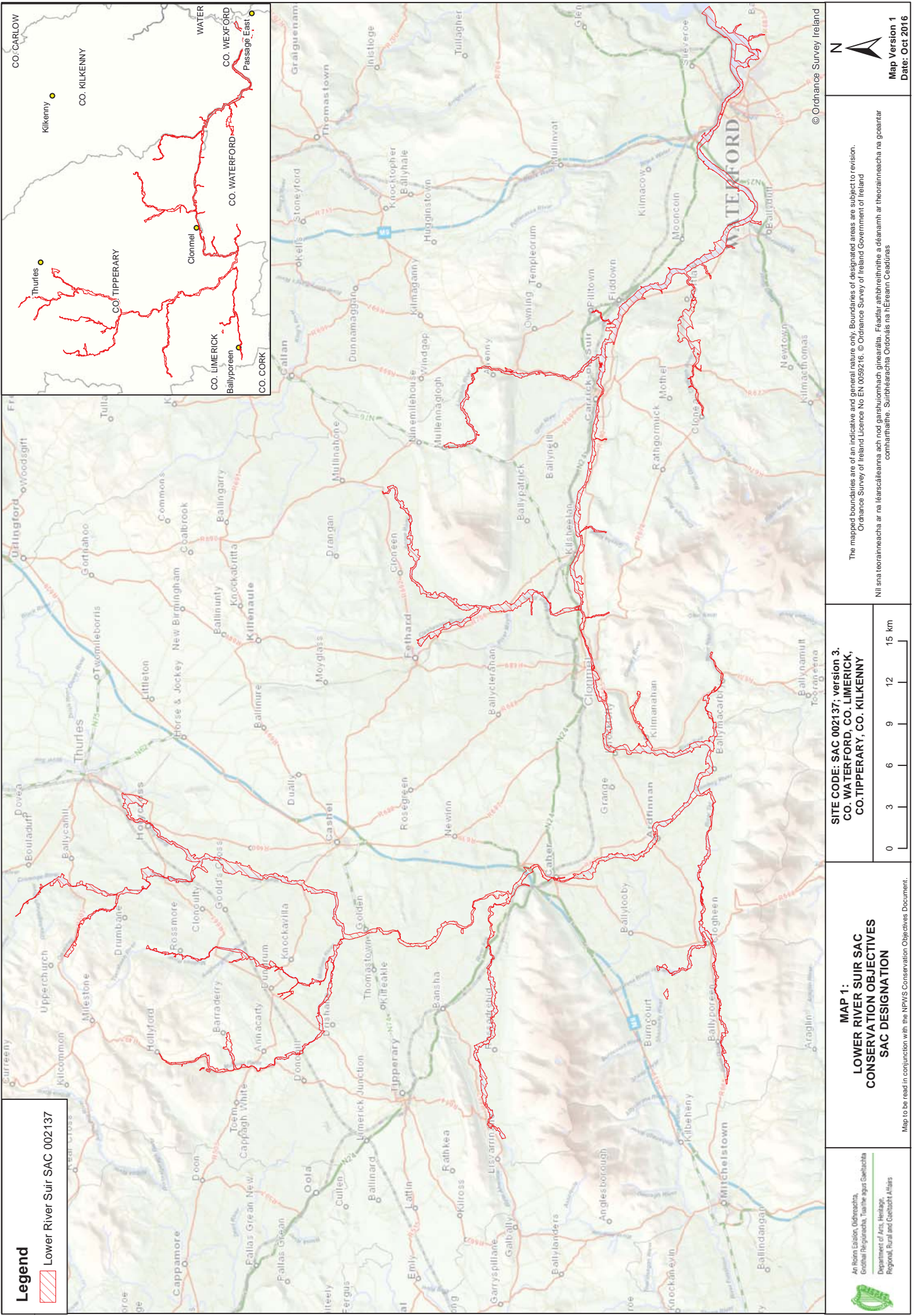
**To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Suir is currently below CL, meeting 79% of CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers currently exceeding their conservation limit (CL). The average electrofishing value for the Suir in 2016 was 10.2 salmon fry, which is below the 17 fry target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice ( <i>Lepeophtheirus salmonis</i> )
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are generally not currently preventing salmon from accessing suitable spawning habitat in Lower River Suir SAC
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

**Conservation Objectives for : Lower River Suir SAC [002137]****1355 Otter *Lutra lutra***

**To maintain the favourable conservation condition of Otter in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al. 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 116.17ha above high water mark (HWM) and 726.61ha along river banks	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 712.27ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (Kruuk, 2006; NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 382.31km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

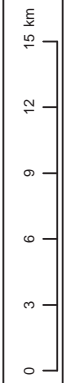


**Legend**  
 Lower River Suir SAC 002137

**SITE CODE: SAC 002137; version 3.**  
**CO. WATERFORD, CO. LIMERICK,**  
**CO. TIPPERARY, CO. KILKENNY**

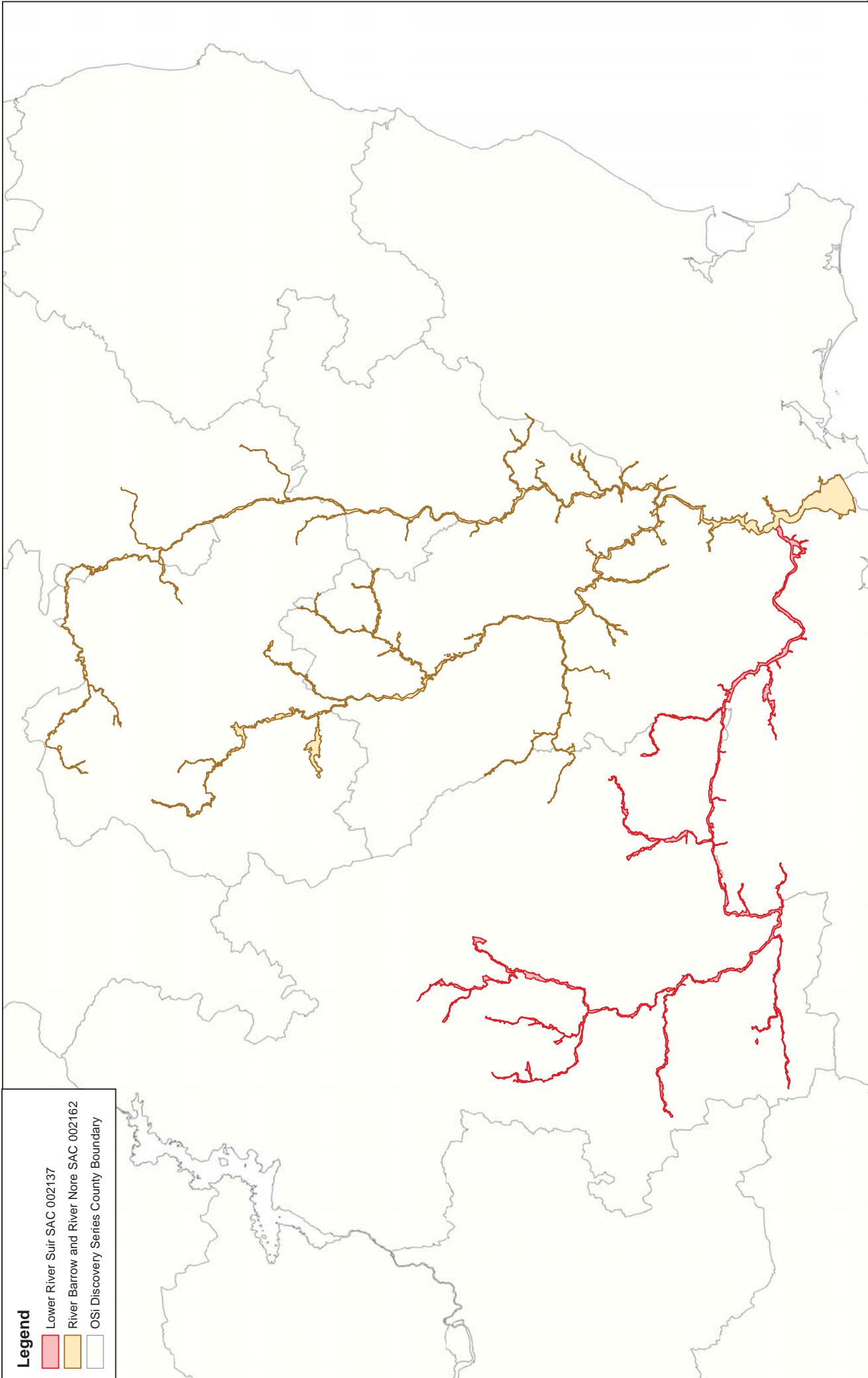
**MAP 1:**  
**LOWER RIVER SUIR SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**

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 Gníothaí Neigheacha, Tuas na gGaibhíochas  
 Department of Arts, Heritage,  
 Regional, Rural and Gaeltacht Affairs



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 comharthaíne. Sárthreachtá Oidhreachta na hÍreann Ceathúas

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 Map Version 1  
 Date: Oct 2016



**Legend**

- Lower River Suir SAC 002137
- River Barrow and River Nore SAC 002162
- OS Discovery Series County Boundary



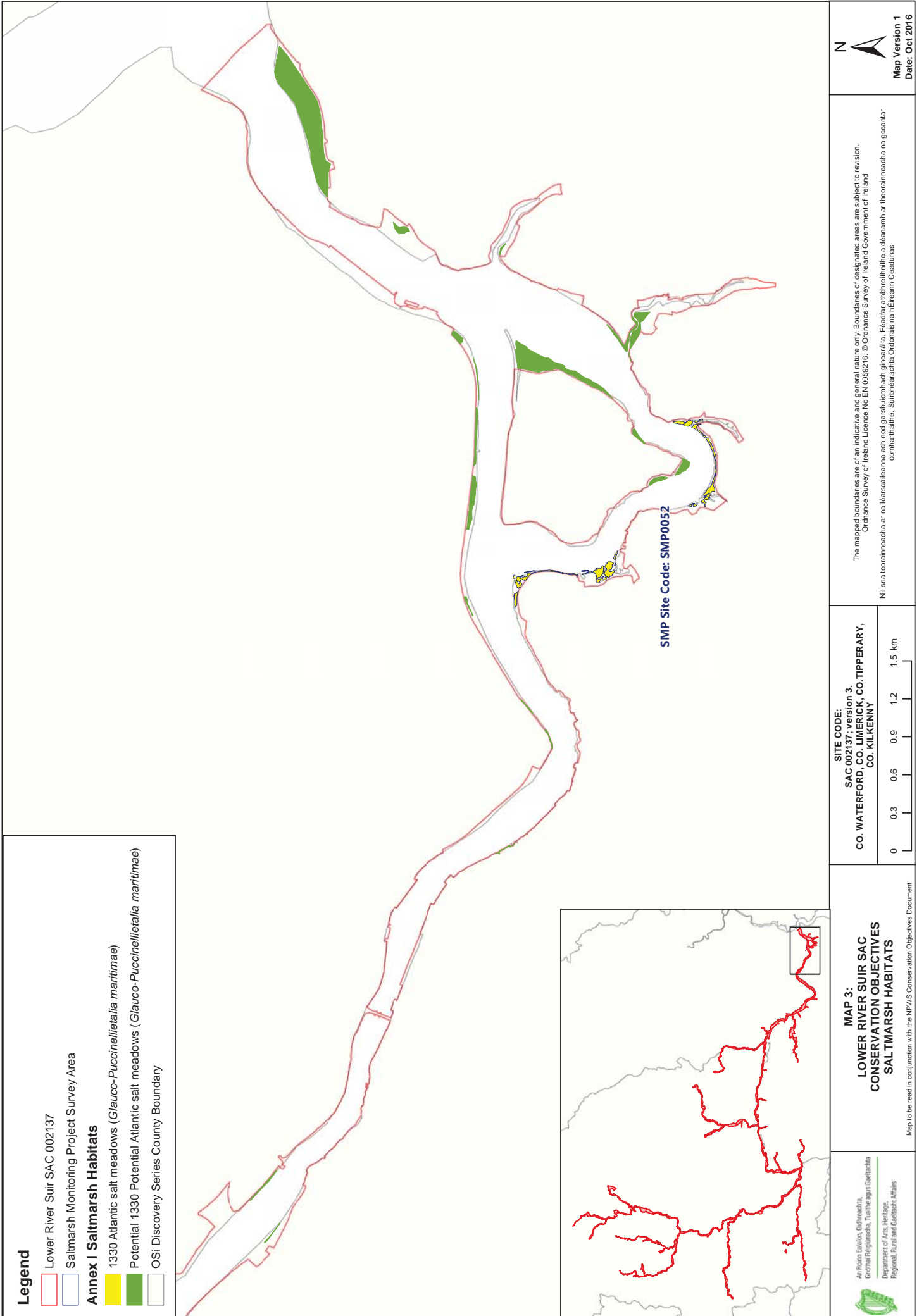
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SAC 002137: version 3. SAC 002162: version 3.01  
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**MAP 2:**  
**LOWER RIVER SUIR SAC**  
**CONSERVATION OBJECTIVES**  
**ADJOINING DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.



**Legend**

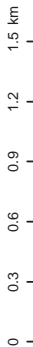
- Lower River Suir SAC 002137
- Saltmarsh Monitoring Project Survey Area
- Annex I Saltmarsh Habitats**
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Potential 1330 Potential Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- OSI Discovery Series County Boundary



**MAP 3:  
LOWER RIVER SUIR SAC  
CONSERVATION OBJECTIVES  
SALTMARSH HABITATS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

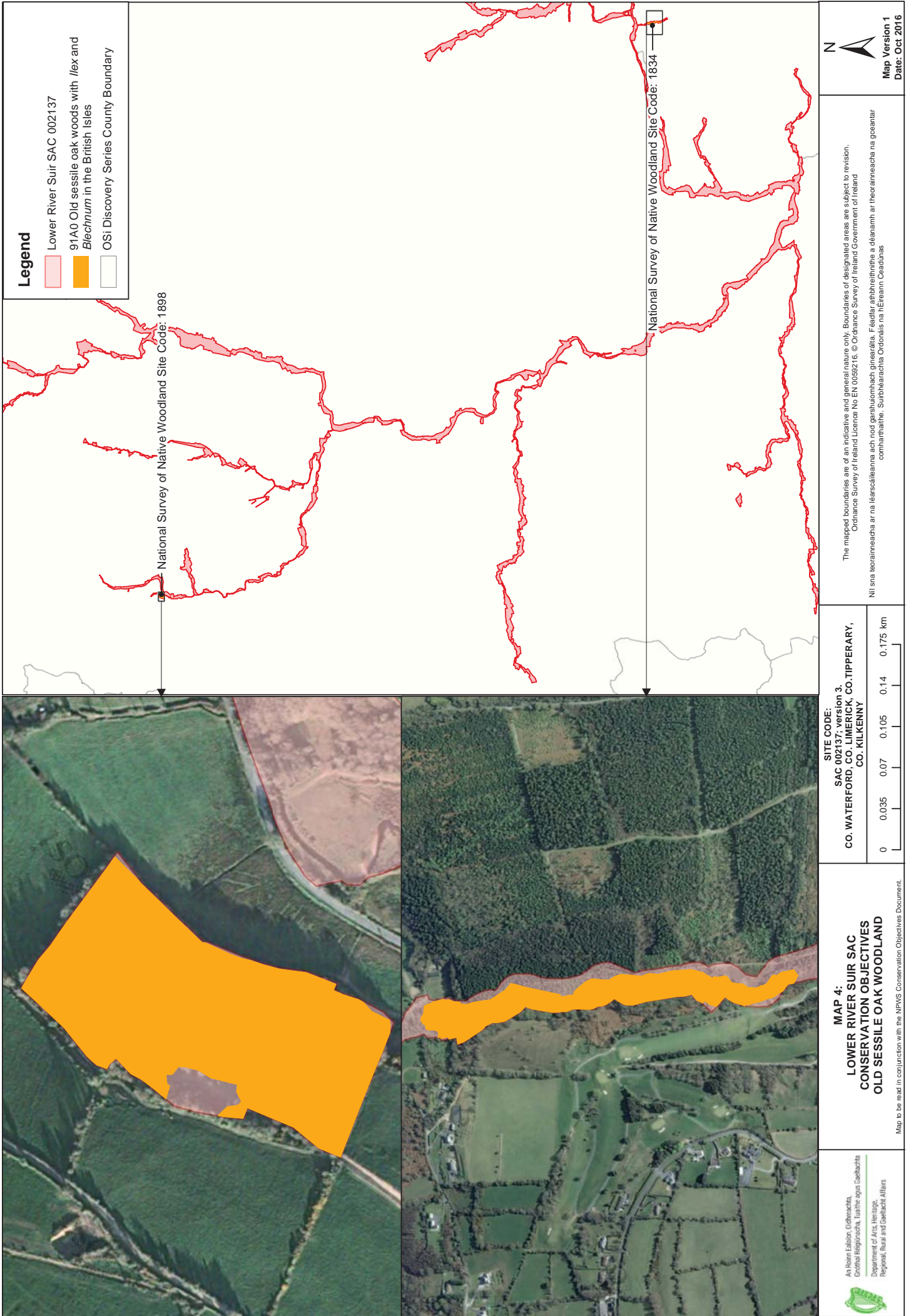
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**Map Version 1  
Date: Oct 2016**



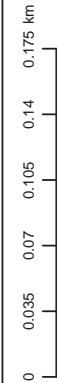
**Legend**

- Lower River Suir SAC 002137
- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- OSi Discovery Series County Boundary

National Survey of Native Woodland Site Code: 1898

National Survey of Native Woodland Site Code: 1834

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 SAC 002137: version 3,  
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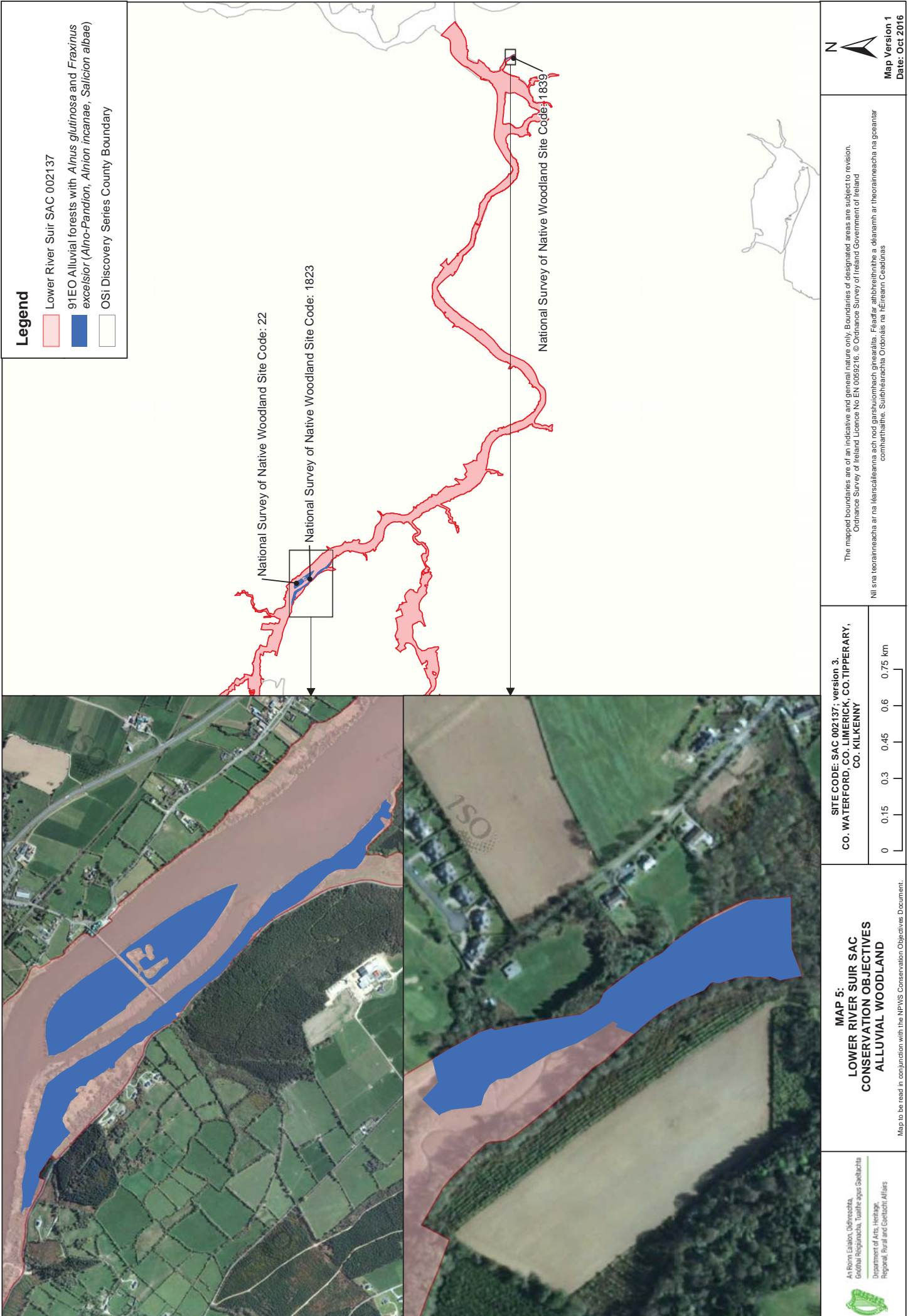
**MAP 4:**  
**LOWER RIVER SUIR SAC**  
**CONSERVATION OBJECTIVES**  
**OLD SESSILE OAK WOODLAND**  
 Map to be read in conjunction with the NIPWS Conservation Objectives Document.

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 comharthaíne. Subleirneacha Oidhreachta na hÉireann. Ceardúnas

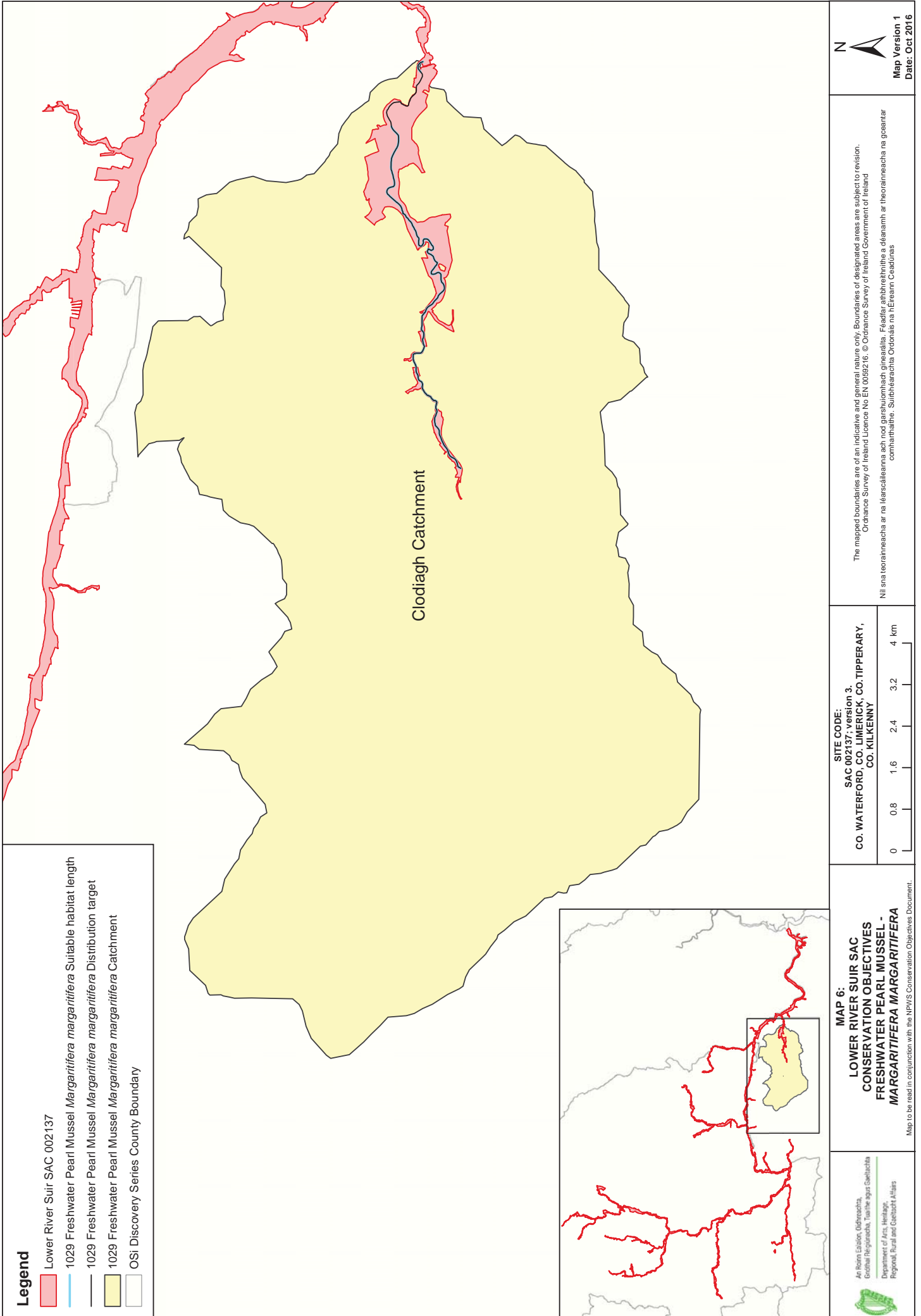
**Map Version 1**  
**Date: Oct 2016**



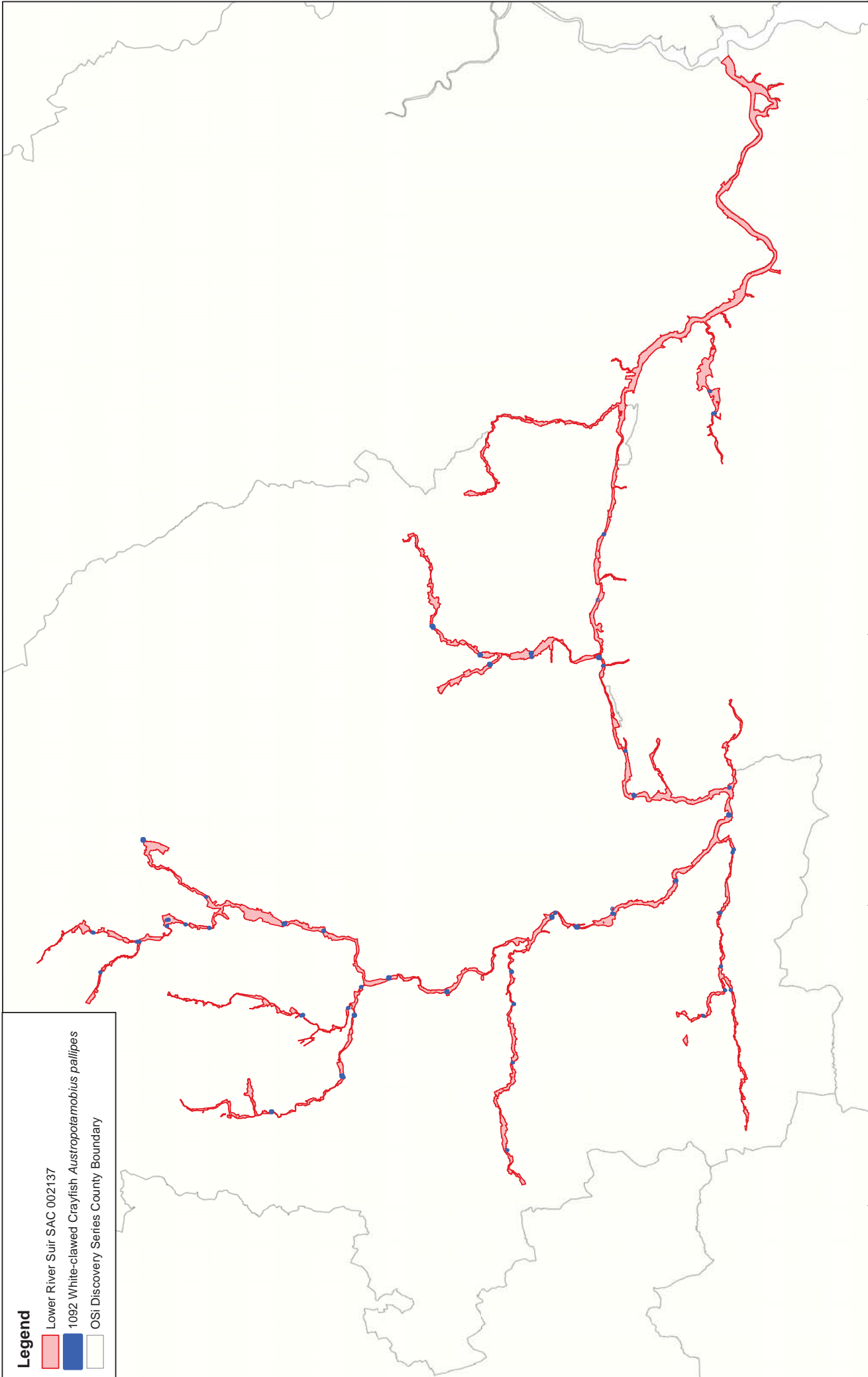


**Legend**

- Lower River Suir SAC 002137
- 91EO Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Pardion*, *Alhion incanae*, *Salicion albae*)
- OSi Discovery Series County Boundary







**Legend**

- Lower River Suir SAC 002137
- 1092 White-clawed Crayfish *Austropotamobius pallipes*
- OSI Discovery Series County Boundary



Map Version 1  
Date: Oct 2016

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**SITE CODE:**  
SAC 002137- version 3,  
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CO. KILKENNY



**MAP 7:**  
**LOWER RIVER SUIR SAC**  
**CONSERVATION OBJECTIVES**  
**WHITE-CLAWED CRAYFISH**  
Map to be read in conjunction with the NPWS Conservation Objectives Document.



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Department of Arts, Heritage,  
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## Conservation objectives for Anglesey Road SAC [002125]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

### Code Description

6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)\*

\* denotes a priority habitat



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**Citation:** NPWS (2018) Conservation objectives for Anglesey Road SAC [002125]. Generic Version 6.0.  
Department of Culture, Heritage and the Gaeltacht.

# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Bolingbrook Hill SAC 002124



An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

**National Parks and Wildlife Service,  
Department of Culture, Heritage and the Gaeltacht,  
90 King Street North, Dublin 7, D07 N7CV, Ireland.**

**Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@chg.gov.ie](mailto:nature.conservation@chg.gov.ie)**

**Citation:**

**NPWS (2018) Conservation Objectives: Bolingbrook Hill SAC 002124. Version 1.  
National Parks and Wildlife Service, Department of Culture, Heritage and the  
Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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002124	Bolingbrook Hill SAC
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
6230	Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*

**Please note that this SAC overlaps with Slievefelim to Silvermines Mountains SPA (004165). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year</b>	2005
<b>Title</b>	Conservation Plan for 2005-2010. Bolingbrook Hill cSAC Site Code 002124 Co. Tipperary
<b>Author</b>	NPWS
<b>Series</b>	Conservation Plan
<b>Year</b>	2012
<b>Title</b>	Ireland Red List No. 8: Bryophytes
<b>Author</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series</b>	Ireland Red List series, NPWS
<b>Year</b>	2013
<b>Title</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author</b>	NPWS
<b>Series</b>	Conservation assessments
<b>Year</b>	2014
<b>Title</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series</b>	Irish Wildlife Manual No. 79
<b>Year</b>	2016
<b>Title</b>	Ireland Red List No. 10: Vascular Plants
<b>Author</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series</b>	Ireland Red Lists series, NPWS

### Other References

<b>Year</b>	2009
<b>Title</b>	Common Standards Monitoring guidance for upland habitats
<b>Author</b>	JNCC
<b>Series</b>	Joint Nature Conservation Committee, Peterborough
<b>Year</b>	2013
<b>Title</b>	Interpretation manual of European Union habitats- Eur 28
<b>Author</b>	European Commission- DG Environment
<b>Series</b>	European Commission



## Conservation Objectives for : Bolingbrook Hill SAC [002124]

### 4010 Northern Atlantic wet heaths with *Erica tetralix*

To maintain the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Bolingbrook Hill SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Northern Atlantic wet heaths with <i>Erica tetralix</i> has not been mapped in detail for Bolingbrook Hill SAC and thus the total area of the qualifying habitat in the SAC is unknown. Wet heath is the main habitat in the western portion of the SAC. The habitat occurs in association with upland acidic grassland on peaty soils and with small areas of blanket bog in the SAC (NPWS, 2005; NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes on Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of wet heath vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present within a 20m radius of each monitoring stop	Attribute and target based on Perrin et al. (2014). Cross-leaved heath is the only characteristic species of the habitat listed in European Commission (2013). Whilst it is seldom abundant in wet heaths, its presence at high frequencies is considered one of the few characteristics common between the varied communities of this habitat (JNCC, 2009)
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. In this SAC, positive indicator species recorded in the habitat include ling ( <i>Calluna vulgaris</i> ), cross-leaved heath ( <i>Erica tetralix</i> ), common cottongrass ( <i>Eriophorum angustifolium</i> ), green-ribbed sedge ( <i>Carex binervis</i> ), milkwort ( <i>Polygala serpyllifolia</i> ), tormentil ( <i>Potentilla erecta</i> ), the lichen <i>Cladonia portentosa</i> , bog mosses ( <i>Sphagnum</i> spp.), pleurocarpous mosses, including <i>Rhytidiadelphus squarrosus</i> , and, in wetter areas, bog asphodel ( <i>Narthecium ossifragum</i> ) and greater sundew ( <i>Drosera rotundifolia</i> ) (NPWS, 2005; NPWS internal files)
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Attribute and target based on Perrin et al. (2014). A plentiful lichen/bryophyte layer is characteristic of this habitat
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Attribute and target based on Perrin et al. (2014). A dwarf shrub layer with ericoid species is characteristic of this habitat (crowberry is only rarely present). Low cover of these species would be indicative of chronic overgrazing, burning, etc.
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Attribute and target based on Perrin et al. (2014). A dwarf shrub layer is characteristic of wet heaths, but the vegetation should be a mixture of dwarf shrub and graminoid species with higher cover of dwarf shrubs being potentially indicative of drainage
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented

Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014). High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing or due to the habitat drying out
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note, however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014). High levels of disturbed <i>Sphagnum</i> would indicate undesirable levels of grazers
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014). Drainage can result in loss of characteristic species and transition to drier habitats
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

## Conservation Objectives for : Bolingbrook Hill SAC [002124]

### 4030 European dry heaths

To maintain the favourable conservation condition of European dry heaths in Bolingbrook Hill SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	European dry heaths has not been mapped in detail for Bolingbrook Hill SAC and thus the total area of the qualifying habitat in the SAC is unknown. Dry heath dominates the centre of the eastern portion of the SAC on the upper slopes of Bolingbrook Hill where it grades into unimproved grassland and also blanket bog. The habitat is also present in the west of the SAC, in the townland of Curryquin. The habitat grades into unimproved grassland, and blanket bog in places, and is also found in mosaic with scrub and bracken ( <i>Pteridium aquilinum</i> ) in the SAC (NPWS, 2005; NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of dry heath vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Attribute and target based on Perrin et al. (2014). Dry heath is not necessarily rich in lichen and bryophyte species, but a minimum amount should still be present
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. Positive indicator species recorded in the habitat in the SAC include bilberry ( <i>Vaccinium myrtillus</i> ), western gorse ( <i>Ulex gallii</i> ), bell heather ( <i>Erica cinerea</i> ) and ling ( <i>Calluna vulgaris</i> ) (NPWS, 2005; NPWS internal files)
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Attribute and target based on Perrin et al. (2014). Bog-myrtle is indicative of flushed conditions and is more characteristic of wet heaths and blanket bogs. Creeping willow is more characteristic of dune heaths. Western gorse is a component of dry heath, but high proportions of it may indicate a history of undesirable levels of grazing
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances

Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014). High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note, however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%	Attribute and target based on Perrin et al. (2014). Senescence is part of the natural cycle of ling, but a dominance of ling in the senescent phase would indicate a lack of management (appropriate grazing or burning) to promote ling regeneration
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. Fires can be part of the natural cycle of heaths and may, under carefully controlled circumstances, be used as an occasional management tool to promote regeneration of, or diversity of growth phases, in ling ( <i>Calluna vulgaris</i> ). However, currently most hill fires in Ireland are intentionally started to encourage grass growth for livestock. Fires which are too intense, too frequent, too extensive or which occur in sensitive areas are damaging to the habitat
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. The growth phases of ling are pioneer (<10cm high), building (10-30cm high) and mature (<30cm high). As burning is undesirable in sensitive areas, it is not reasonable to require the stated diversity of growth phases within these areas
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human foot prints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

**Conservation Objectives for : Bolingbrook Hill SAC [002124]****6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)**

**To maintain the favourable conservation condition of Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)\* in Bolingbrook Hill SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The total current area of species-rich <i>Nardus</i> grassland, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe)* in Bolingbrook Hill SAC is unknown. It is documented that the priority habitat occurs on the lower slopes of Bolingbrook Hill and Curryquin and is found in mosaic with wet heath, damp grassland and, in places, blanket bog (NPWS, 2005; NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes on Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of species-rich <i>Nardus</i> grassland* vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: high quality indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least two high quality indicator species for base-rich examples of the habitat and at least one for base-poor examples of the habitat	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: species richness	Number of species at a representative number of 2m x 2m monitoring stops	Species richness at each monitoring stop at least 25	Attribute and target based on Perrin et al. (2014). Species richness is a key characteristic of species-rich <i>Nardus</i> grasslands (6230)* which distinguishes it from species-poor <i>Nardus</i> swards that are very common in the uplands of Ireland and the UK. Vascular plant, bryophyte and lichen species are counted
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than or equal to 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of negative indicator species individually less than or equal to 10% and collectively less than or equal to 20%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: <i>Sphagnum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Sphagnum</i> species less than or equal to 10%	Attribute and target based on Perrin et al. (2014). High cover of <i>Sphagnum</i> mosses would not be characteristic of species-rich <i>Nardus</i> grasslands* and may indicate changes in hydrology or soil nutrients within the habitat, but is more likely to indicate that the community is inherently a marginal example of the habitat

Vegetation composition: <i>Polytrichum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Polytrichum</i> species less than or equal to 25%	Attribute and target based on Perrin et al. (2014). High cover of <i>Polytrichum</i> mosses would not be characteristic of species-rich <i>Nardus</i> grasslands* and may indicate changes in hydrology or soil nutrients within the habitat, but is more likely to indicate that the community is inherently a marginal example of the habitat
Vegetation composition: shrubs, bracken and heath cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of shrubs, bracken ( <i>Pteridium aquilinum</i> ) and heath collectively less than or equal to 5%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community, and high cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing
Vegetation structure: forb to graminoid ratio	Percentage cover at a representative number of 2m x 2m monitoring stops	Forb component of forb:graminoid ratio is 20-90%	Attribute and target based on Perrin et al. (2014). Forb richness is characteristic of conservation value swards
Vegetation structure: sward height	Sward height at a representative number of 2m x 2m monitoring stops	Proportion of the sward between 5cm and 50cm tall is at least 25%	Attribute and target based on Perrin et al. (2014). The lower and upper height limits are set to record overgrazing and undergrazing respectively
Vegetation structure: litter cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of litter less than or equal to 20%	Attribute and target based on Perrin et al. (2014). High levels of leaf litter can be indicative of undergrazing and rank swards, with a resulting impact on species richness
Physical structure: disturbed bare ground	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than or equal to 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on Perrin et al. (2014). Serious overgrazing and disturbance can impact on species richness, nutrient status and soil stability
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

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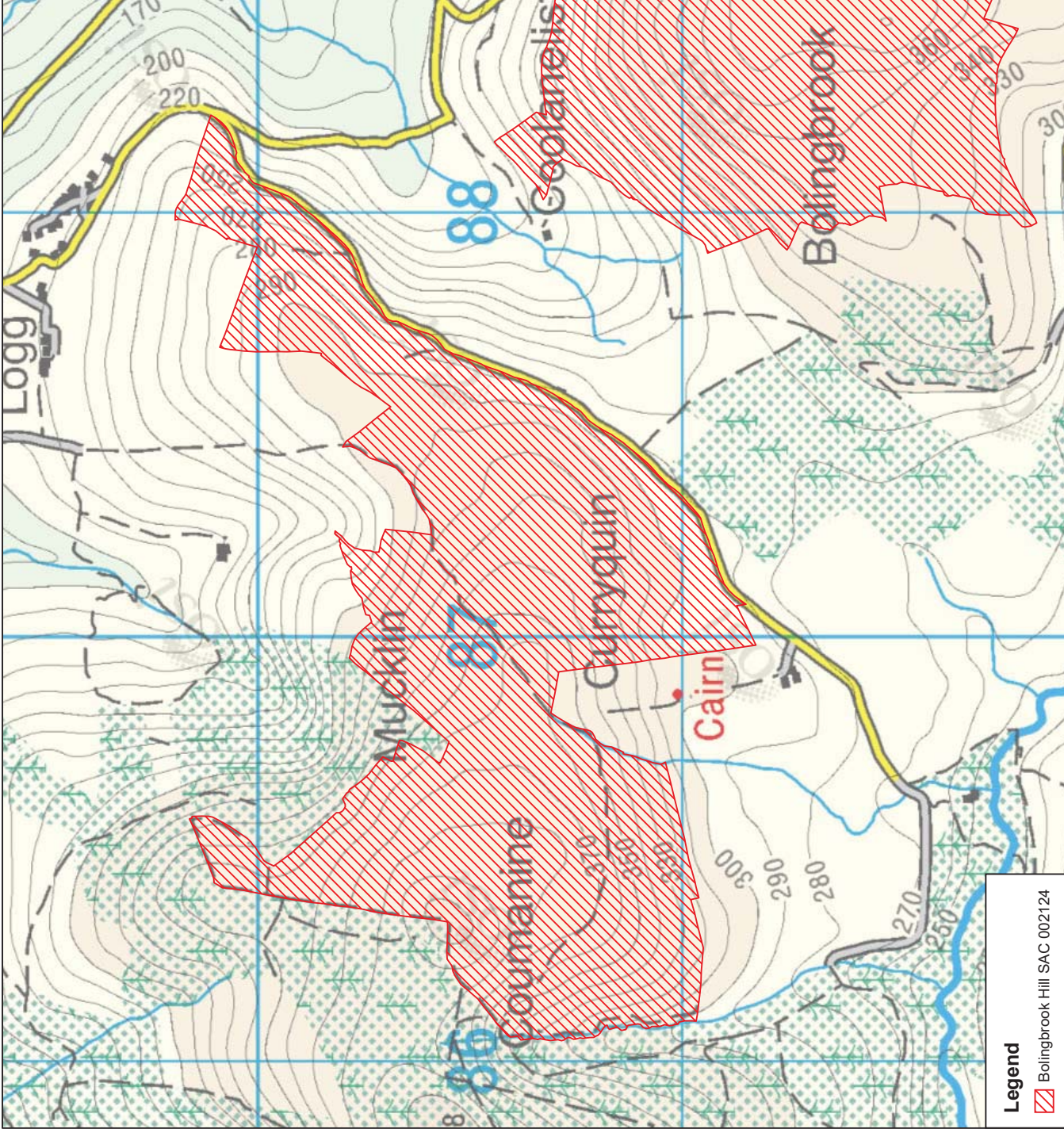
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**Legend**

Bolingbrook Hill SAC 002124

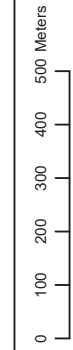
An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht



**MAP 1:**  
**BOLINGBROOK HILL SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
SAC 002124; version 3.01. CO. TIPPERARY



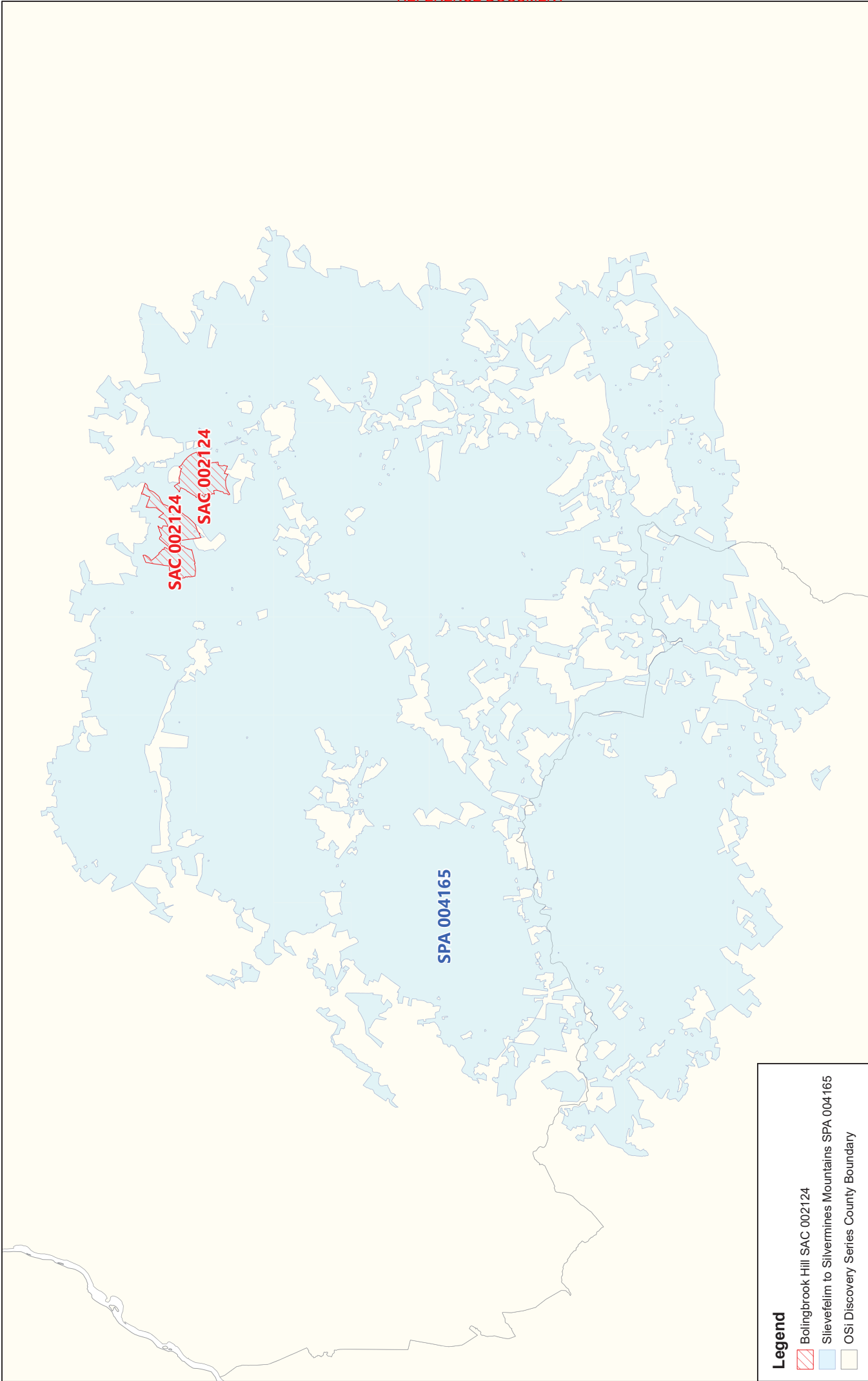
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Map Version 1  
Date: June 2018

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**Legend**

-  Bolingbrook Hill SAC 002124
-  Slievefelim to Silvermines Mountains SPA 004165
-  OSI Discovery Series County Boundary



**MAP 2:  
BOLINGBROOK HILL SAC  
CONSERVATION OBJECTIVE  
OVERLAPPING DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 002124; version 3.01. SPA 004165; version 3.  
CO. TIPPERARY / CO. LIMERICK**



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**Map Version 1  
Date: June 2018**



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Keeper Hill SAC 001197



An Roinn  
Cultúir, Oidhreachta agus Gaeltachta  

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Department of  
Culture, Heritage and the Gaeltacht



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Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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001197	Keeper Hill SAC
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
7130	Blanket bogs (* if active bog)

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Please note that this SA overlaps with Slieve Donard to Silverdale  
 County Down SPA. See also The Conservation Objectives for  
 this site should be used in conjunction with those for the overlapping  
 site as appropriate.

## Supporting documents, relevant reports & publications

*Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)*

### NPWS Documents

<b>Year :</b>	2005
<b>Title :</b>	Conservation Plan for 2005-2010. Keeper Hill cSAC Site Code 001197 Co. Tipperary
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation Plan
<hr/>	
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<hr/>	
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<hr/>	
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS
<hr/>	
<b>Year :</b>	2017
<b>Title :</b>	Keeper Hill SAC (1197) Conservation objectives supporting document- blanket bogs and associated habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<hr/>	

## Conservation Objectives for : Keeper Hill SAC [001197]

### 4010 Northern Atlantic wet heaths with *Erica tetralix*

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Keeper Hill SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Northern Atlantic wet heaths with <i>Erica tetralix</i> has not been mapped in detail for this SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 126ha, covering 31% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Keeper Hill SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Wet heath is documented to occur throughout the SAC, often occurring in a mosaic with blanket bog, dry heath and upland grassland (NPWS, 2005; NPWS internal files). Further information can be found within NPWS (2005), NPWS internal files and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Wet heath vegetation communities have been recorded in this SAC (NPWS internal files), one of which corresponds to a community recorded in the National Survey of Upland Habitats and listed in the provisional list of vegetation communities described in Perrin et al. (2014). Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present within a 20m radius of each monitoring stop	Attribute and target based on Perrin et al. (2014)
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)

Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

## Conservation Objectives for : Keeper Hill SAC [001197]

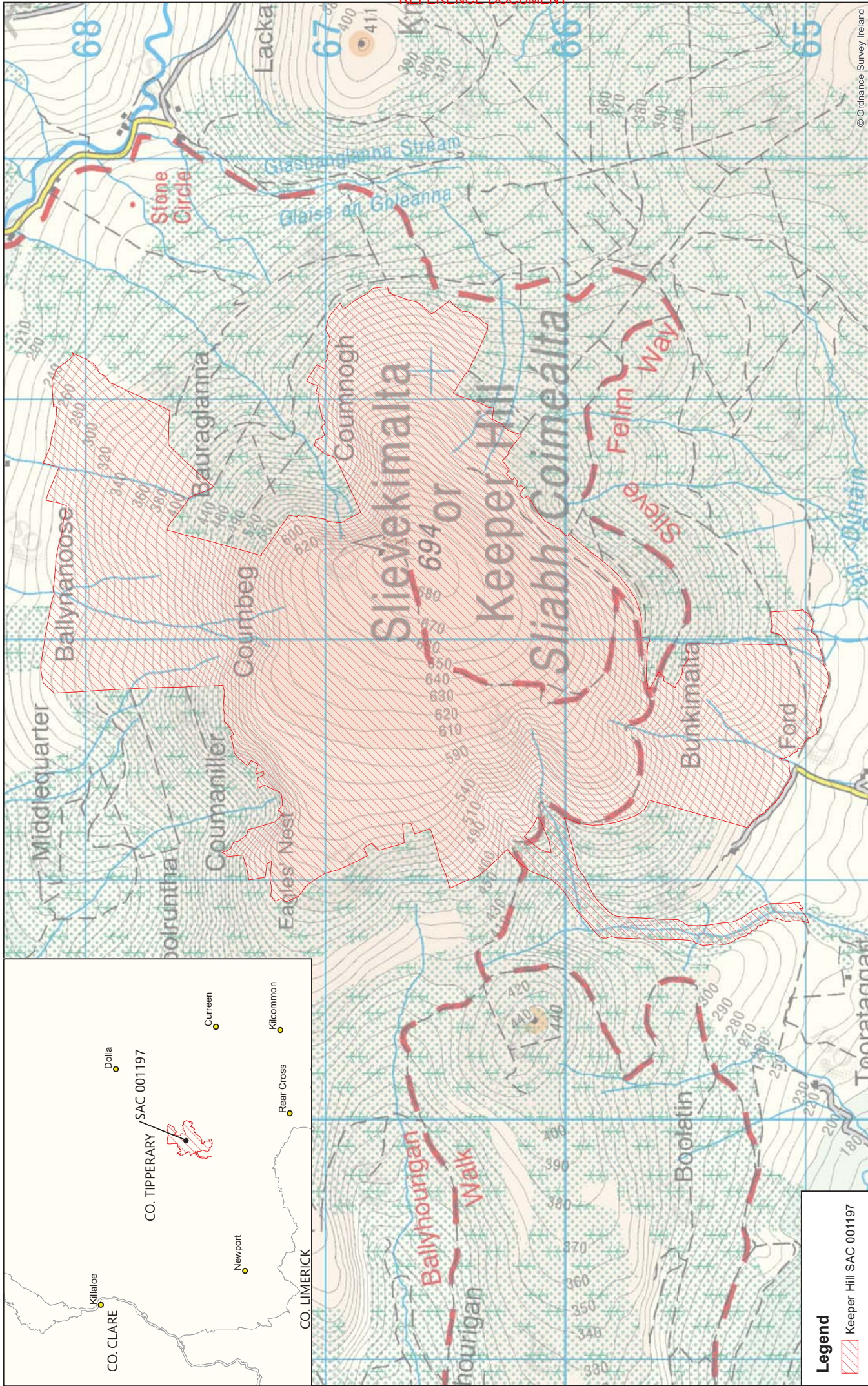
### 7130 Blanket bogs (\* if active bog)

**To restore the favourable conservation condition of Blanket bogs (\* if active bog) in Keeper Hill SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Blanket bog has not been mapped in detail for Keeper Hill SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 126ha, covering 31% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Keeper Hill SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Blanket bog is documented to occur in a mosaic with wet heath in the SAC. It is most common on the higher slopes including the upper ridge (NPWS, 2005; NPWS internal files). Further information can be found within NPWS (2005), NPWS internal files and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: peat formation	Active blanket bog as a proportion of the total area of Annex I blanket bog habitat	At least 99% of the total Annex I blanket bog area is active	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Further details and a brief discussion of restoration potential is presented in the blanket bogs and associated habitats supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The diversity of blanket bog vegetation communities in this SAC is unknown. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding <i>Sphagnum fallax</i> , at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 75%	Attribute and target based on Perrin et al. (2014). See the blanket bogs and associated habitats supporting document for the list of potential dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014)



Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: erosion	Percentage area in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Attribute and target based on Perrin et al. (2014)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The Near Threatened moss <i>Sphagnum russowii</i> (Lockhart et al., 2012) occurs in blanket bog in the SAC (NPWS, 2005)



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Map Version 1  
Date: Aug 2017

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Níl sna teorainneacha ar na léarscálacha seo ach mod gneáhuimhach, ginearálta. Fásadair abhróibhinnthe a déanamh ar theorainneacha na geoinnair comharthaí. Sárthéarmaíocht Oidreachais na hÉireann Ceardúnas Uimh EN 0059216. © Sárthéarmaíocht Oidreachais na hÉireann Riailas na hÉireann.

SITE CODE:  
SAC.001197; version 3.  
CO. TIPPERARY



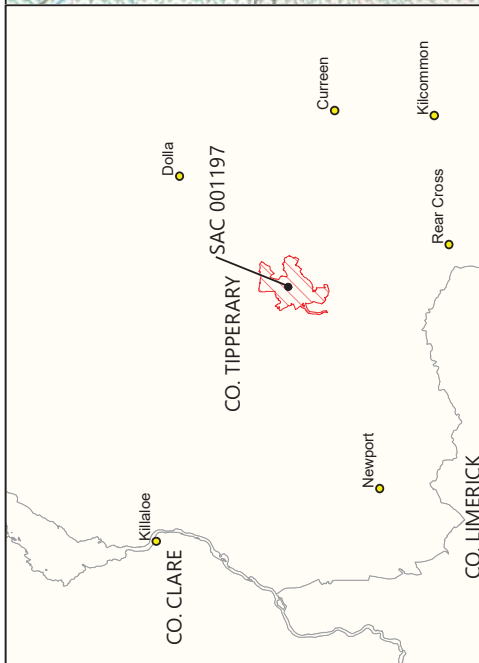
MAP 1:  
KEEPER HILL SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**Legend**

Keeper Hill SAC 001197

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Culture, Heritage and the Gaeltacht





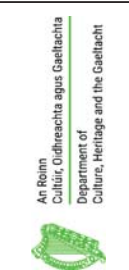
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SITE CODE:  
SAC 001197; version 3. SPA 004165; version 3.  
CO. TIPPERARY

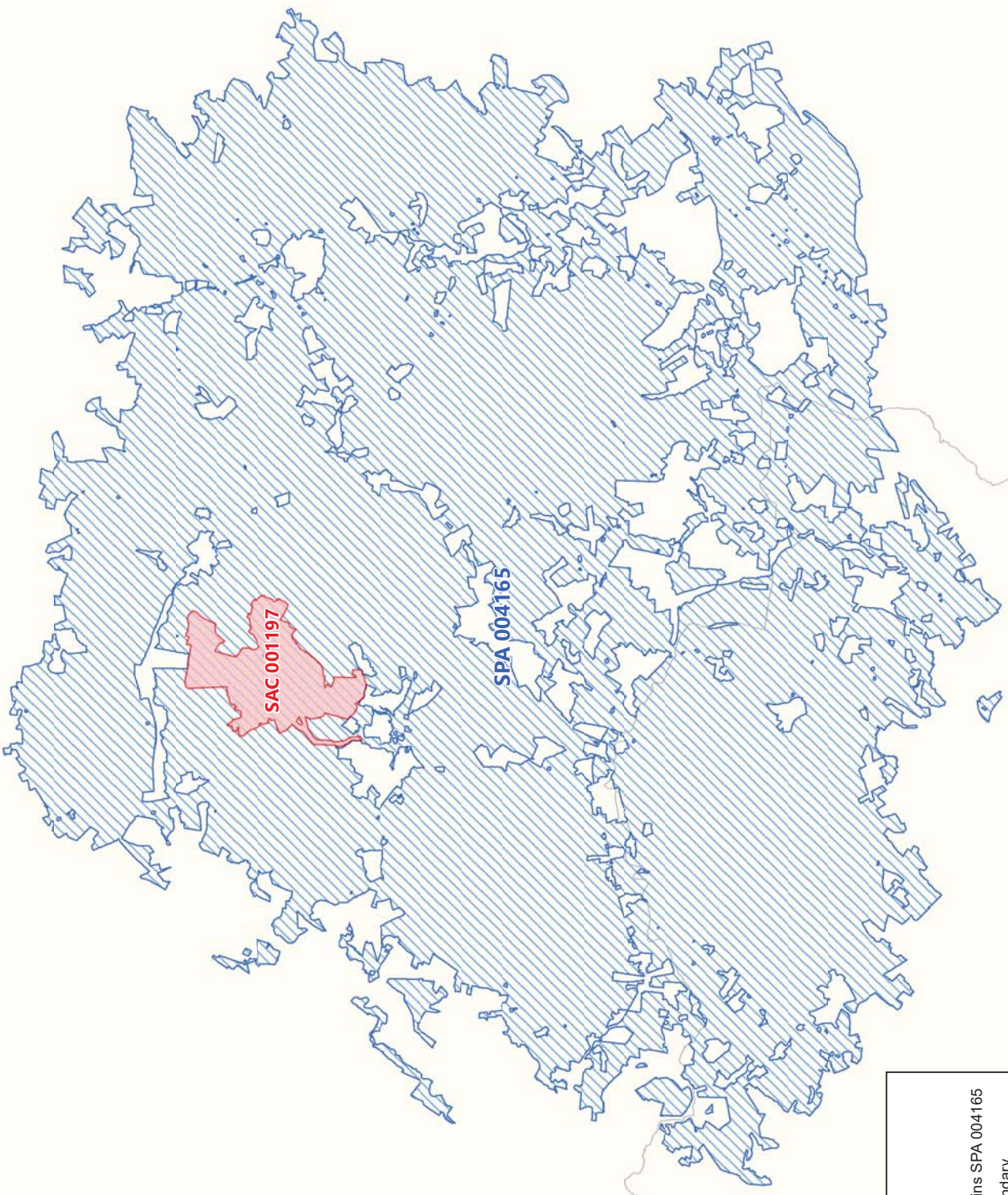


MAP 2:  
KEEPER HILL SAC  
CONSERVATION OBJECTIVES  
OVERLAPPING DESIGNATION  
Map to be read in conjunction with the NPWS Conservation Objectives Document.



**Legend**

- Keeper Hill SAC 001197
- Slievefilm to Silvermines Mountains SPA 004165
- OSI Discovery Series County Boundary



# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Silvermine Mountains SAC 000939



An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

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Department of Culture, Heritage and the Gaeltacht,  
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**Citation:**

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and the Gaeltacht.**

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## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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000939	Silvermine Mountains SAC
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
6230	Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*

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**Please note that this SAC overlaps with Slievefelim to Silvermines Mountains SPA (004165). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year</b>	2005
<b>Title</b>	Conservation Plan for 2005-2010. Silvermine Mountains cSAC Site Code 000939 Co. Tipperary
<b>Author</b>	NPWS
<b>Series</b>	Conservation Plan
<b>Year</b>	2007
<b>Title</b>	Grasslands monitoring project 2006
<b>Author</b>	Dwyer, R.; Crowley, W.; Wilson, F.
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2012
<b>Title</b>	Ireland Red List No. 8: Bryophytes
<b>Author</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series</b>	Ireland Red List series, NPWS
<b>Year</b>	2013
<b>Title</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author</b>	NPWS
<b>Series</b>	Conservation assessments
<b>Year</b>	2014
<b>Title</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series</b>	Irish Wildlife Manual No. 79
<b>Year</b>	2016
<b>Title</b>	Ireland Red List No. 10: Vascular Plants
<b>Author</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series</b>	Ireland Red Lists series, NPWS

### Other References

<b>Year</b>	2009
<b>Title</b>	Common Standards Monitoring guidance for upland habitats
<b>Author</b>	JNCC
<b>Series</b>	Joint Nature Conservation Committee, Peterborough
<b>Year</b>	2013
<b>Title</b>	Interpretation manual of European Union habitats- Eur 28
<b>Author</b>	European Commission- DG Environment
<b>Series</b>	European Commission



## Conservation Objectives for : Silvermine Mountains SAC [000939]

### 4010 Northern Atlantic wet heaths with *Erica tetralix*

**To maintain the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Silvermine Mountains SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Northern Atlantic wet heaths with <i>Erica tetralix</i> has not been mapped in detail for Silvermine Mountains SAC and thus the total area of the qualifying habitat in the SAC is unknown. However, it is documented that wet heath is the dominant habitat in the SAC (NPWS, 2005), occurring on both sides of the road that cuts through this upland SAC, being most extensive on the east side. The habitat occurs in association with species-rich <i>Nardus</i> grassland (6230*) and upland grassland in the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of wet heath vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present within a 20m radius of each monitoring stop	Attribute and target based on Perrin et al. (2014). Cross-leaved heath is the only characteristic species of the habitat listed in European Commission (2013). Whilst it is seldom abundant in wet heaths, its presence at high frequencies is considered one of the few characteristics common between the varied communities of this habitat (JNCC, 2009)
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. The positive indicator species ling ( <i>Calluna vulgaris</i> ) and tormentil ( <i>Potentilla erecta</i> ) have been recorded in the habitat in the SAC along with purple moor-grass ( <i>Molinia caerulea</i> ) and bilberry ( <i>Vaccinium myrtillus</i> ), with rushes ( <i>Juncus effusus</i> and <i>J. acutiflorus</i> ), marsh arrowgrass ( <i>Triglochin palustris</i> ), meadow thistle ( <i>Cirsium dissectum</i> ) and common butterwort ( <i>Pinguicula vulgaris</i> ) in localised flushed areas (NPWS, 2005)
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Attribute and target based on Perrin et al. (2014). A plentiful lichen/bryophyte layer is characteristic of this habitat
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Attribute and target based on Perrin et al. (2014). A dwarf shrub layer with ericoid species is characteristic of this habitat (crowberry is only rarely present). Low cover of these species would be indicative of chronic overgrazing, burning, etc.
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Attribute and target based on Perrin et al. (2014). A dwarf shrub layer is characteristic of wet heaths, but the vegetation should be a mixture of dwarf shrub and graminoid species with higher cover of dwarf shrubs being potentially indicative of drainage
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented

Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014). High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing or due to the habitat drying out
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note, however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014). High levels of disturbed <i>Sphagnum</i> would indicate undesirable levels of grazers
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014). Drainage can result in loss of characteristic species and transition to drier habitats
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

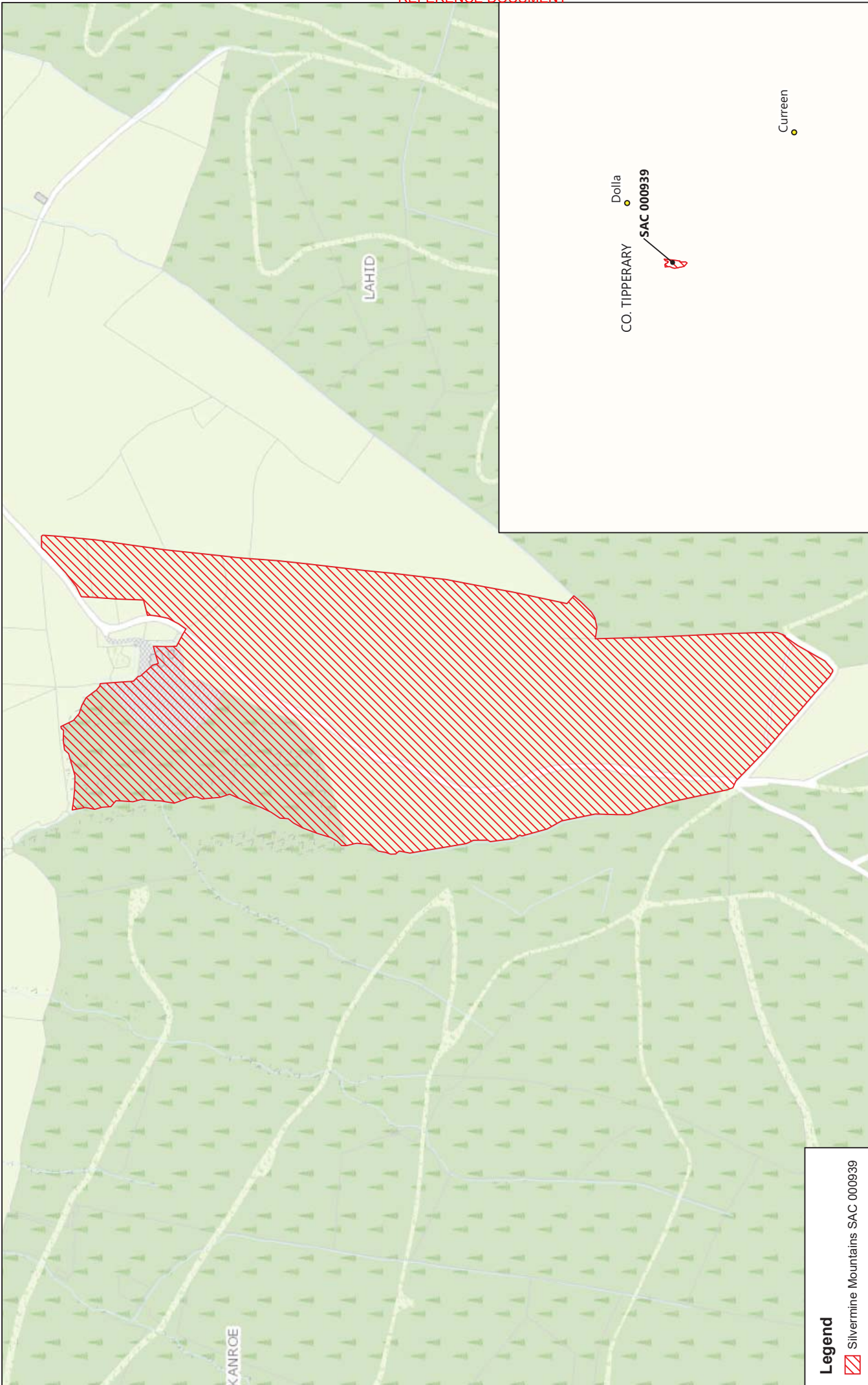
## Conservation Objectives for : Silvermine Mountains SAC [000939]

### 6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)

To restore the favourable conservation condition of Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)\* in Silvermine Mountains SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The total area of species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* in Silvermine Mountains SAC is currently unknown. The habitat was surveyed as part of the Grasslands Monitoring Project 2006 by Dwyer et al. (2007) who state that it occurs mainly in the very north-east of the SAC and also in strips along the western side of the roadway that runs through this upland SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of species-rich <i>Nardus</i> grassland* vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Positive indicator species recorded in the habitat in the SAC by Dwyer et al. (2007) include common bent-grass ( <i>Agrostis capillaris</i> ), sweet vernal-grass ( <i>Anthoxanthum odoratum</i> ), tormentil ( <i>Potentilla erecta</i> ), sheep's-fescue ( <i>Festuca ovina</i> ), heath bedstraw ( <i>Galium saxatile</i> ), heath wood-rush ( <i>Luzula multiflora</i> ) and the moss <i>Rhytidiadelphus squarrosus</i>
Vegetation composition: high quality indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least two high quality indicator species for base-rich examples of the habitat and at least one for base-poor examples of the habitat	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: species richness	Number of species at a representative number of 2m x 2m monitoring stops	Species richness at each monitoring stop at least 25	Attribute and target based on Perrin et al. (2014). Species richness is a key characteristic of species-rich <i>Nardus</i> grasslands (6230*) which distinguishes it from species-poor <i>Nardus</i> swards that are very common in the uplands of Ireland and the UK. Vascular plant, bryophyte and lichen species are counted
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than or equal to 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of negative indicator species individually less than or equal to 10% and collectively less than or equal to 20%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented

Vegetation composition: <i>Sphagnum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Sphagnum</i> species less than or equal to 10%	Attribute and target based on Perrin et al. (2014). High cover of <i>Sphagnum</i> mosses would not be characteristic of species-rich <i>Nardus</i> grasslands* and may indicate changes in hydrology or soil nutrients within the habitat, but is more likely to indicate that the community is inherently a marginal example of the habitat
Vegetation composition: <i>Polytrichum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Polytrichum</i> species less than or equal to 25%	Attribute and target based on Perrin et al. (2014). High cover of <i>Polytrichum</i> mosses would not be characteristic of species-rich <i>Nardus</i> grasslands* and may indicate changes in hydrology or soil nutrients within the habitat, but is more likely to indicate that the community is inherently a marginal example of the habitat
Vegetation composition: shrubs, bracken and heath cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of shrubs, bracken ( <i>Pteridium aquilinum</i> ) and heath collectively less than or equal to 5%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community, and high cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing. Dwyer et al. (2007) noted bracken and scrub encroachment as a negative impact on the habitat in the SAC
Vegetation structure: forb to graminoid ratio	Percentage cover at a representative number of 2m x 2m monitoring stops	Forb component of forb:graminoid ratio is 20-90%	Attribute and target based on Perrin et al. (2014). Forb richness is characteristic of conservation value swards
Vegetation structure: sward height	Sward height at a representative number of 2m x 2m monitoring stops	Proportion of the sward between 5cm and 50cm tall is at least 25%	Attribute and target based on Perrin et al. (2014). The lower and upper height limits are set to record overgrazing and undergrazing respectively
Vegetation structure: litter cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of litter less than or equal to 20%	Attribute and target based on Perrin et al. (2014). High levels of leaf litter can be indicative of undergrazing and rank swards, with a resulting impact on species richness
Physical structure: disturbed bare ground	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than or equal to 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on Perrin et al. (2014). Serious overgrazing and disturbance can impact on species richness, nutrient status and soil stability
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 (FPO) and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The FPO listed and Vulnerable small-white orchid ( <i>Pseudorchis albida</i> ) (Wyse Jackson et al., 2016) occurs in the habitat in the SAC (NPWS, 2005; Dwyer et al., 2007)



**Legend**

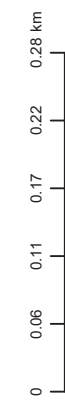
 Silvermine Mountains SAC 000939

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Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

**MAP 1:  
SILVERMINE MOUNTAINS SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 000939; version 3. CO. TIPPERARY**

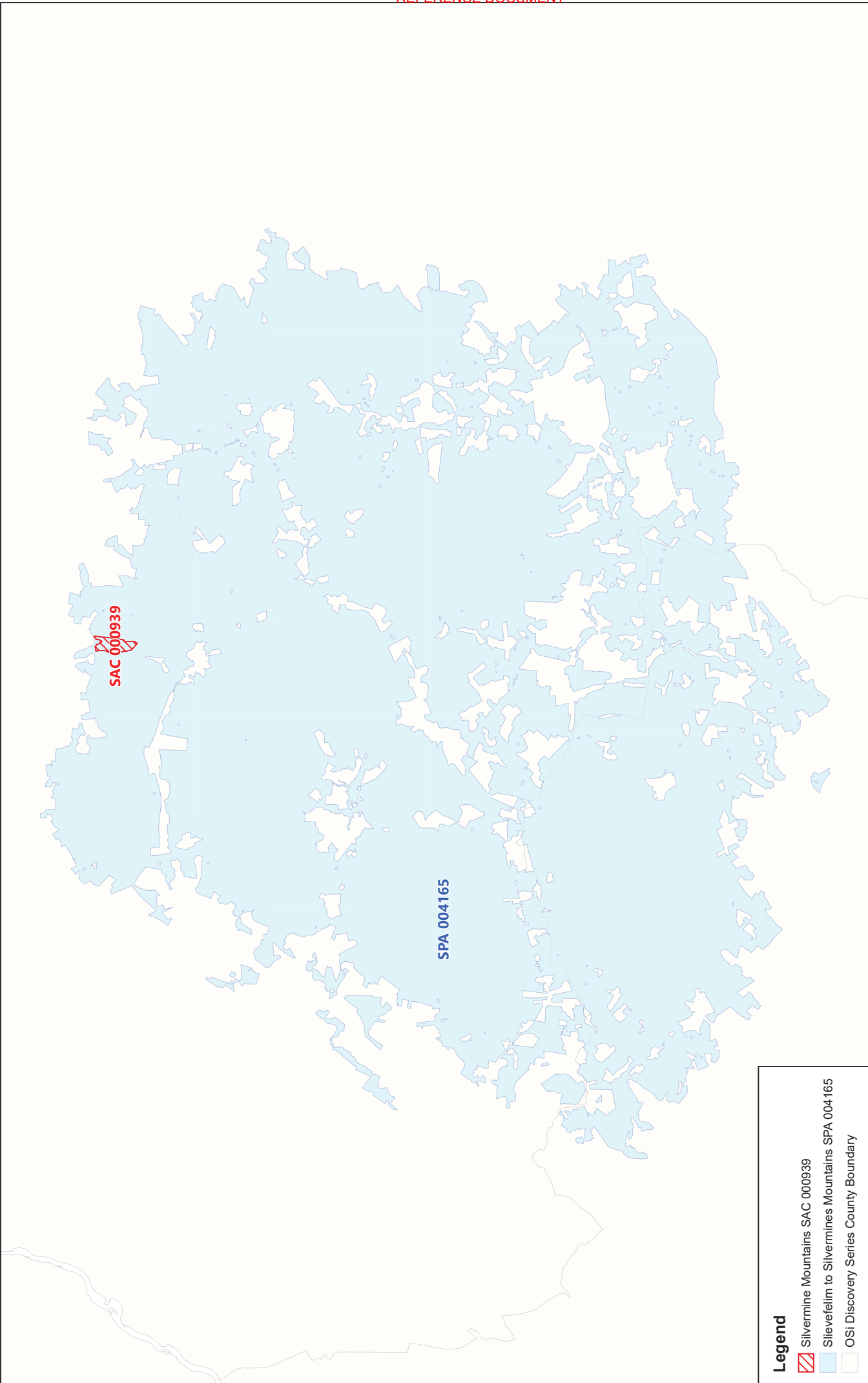


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Ordnance Survey of Ireland Licence No EN 0069216. © Ordnance Survey of Ireland Government of Ireland




Níl sna teorainneacha ar na léarscálteanna ach níos gairbhíochach ginearálta. Fáidtar athbheithníne a dhéanamh ar theorainneacha na gceantar comhairle. Surbhíearachta Oronais na hÉireann Ceardúas Úrnl EN 0069216. © Surbhíearachta Oronais na hÉireann Rialtas na hÉireann



Map Version 1  
Date: June 2018



**Legend**

-  Silvermine Mountains SAC 000939
-  Slievefeilim to Silvermines Mountains SPA 004165
-  OSI/Discovery Series County Boundary


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**MAP 2:  
SILVERMINE MOUNTAINS SAC  
CONSERVATION OBJECTIVES  
OVERLAPPING DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 000939; version 3. SPA 004165; version 3.  
CO. TIPPERARY / CO. LIMERICK**



The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscálteanna ach níos ginearálta ach ní ginearálta. Fágáir atbhreithníthe a cúlú ar theorainneacha na gceantar comhairle. Suirbhíreachta Oribnais na hÉireann Ceadúnas Úrnl EN 0069216. © Suirbhíreachta Oribnais na hÉireann Rialtas na hÉireann

 **Map Version 1**  
**Date: June 2018**

# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Silvermines Mountains West SAC 002258



An Roinn  
Cultúir, Oidhreachta agus Gaeltachta  

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Department of  
Culture, Heritage and the Gaeltacht



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## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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002258	Silvermines Mountains West SAC
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
6130	Calaminarian grasslands of the <i>Violetalia calaminariae</i>

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**Please note that this SAC overlaps with Slievefelim to Silvermines Mountain SPA (004165) and is adjacent to Lower River Shannon SAC (002165). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year</b>	2009
<b>Title</b>	Bryophytes and metallophyte vegetation on metalliferous mine-waste in Ireland
<b>Author</b>	Holyoak, D.T.
<b>Series</b>	Unpublished report to NPWS
<b>Year</b>	2012
<b>Title</b>	Ireland Red List No. 8: Bryophytes
<b>Author</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series</b>	Ireland Red List series, NPWS
<b>Year</b>	2013
<b>Title</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author</b>	NPWS
<b>Series</b>	Conservation assessments
<b>Year</b>	2014
<b>Title</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series</b>	Irish Wildlife Manual No. 79
<b>Year</b>	2016
<b>Title</b>	Ireland Red List No. 10: Vascular Plants
<b>Author</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series</b>	Ireland Red Lists series, NPWS

### Other References

<b>Year</b>	2000
<b>Title</b>	Appendix 2. Notes on the status and ecology of <i>Ditrichum cornubicum</i>
<b>Author</b>	Holyoak, D.T.; Clements, R.; Coleman, M.R.J.; MacPherson, K.S.
<b>Series</b>	English Nature Research Reports, No. 328: 40-50
<b>Year</b>	2001
<b>Title</b>	Heavy metal concentrations in the soil substrates associated with rare bryophytes at former metalliferous mining sites in East Cornwall
<b>Author</b>	Walsh, L.
<b>Series</b>	Unpublished B.Sc. Thesis, University of Hertfordshire
<b>Year</b>	2009
<b>Title</b>	Common Standards Monitoring guidance for upland habitats
<b>Author</b>	JNCC
<b>Series</b>	Joint Nature Conservation Committee, Peterborough
<b>Year</b>	2012
<b>Title</b>	Rare and threatened bryophytes of Ireland
<b>Author</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series</b>	National Museums Northern Ireland

**Year** 2013  
**Title** Conservation of selected legally protected and Red Listed bryophytes in Ireland  
**Author** Campbell, C.  
**Series** Unpublished Ph.D. Thesis, Trinity College Dublin

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**Year** 2013  
**Title** Interpretation manual of European Union habitats- Eur 28  
**Author** European Commission- DG Environment  
**Series** European Commission

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## Spatial data sources

Year	2012
Title	Bryophytes and Metallophyte Vegetation on Metalliferous Mine-waste in Ireland
Operations	Sites identified; clipped to SAC boundary
Source	6130 (map 3)

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## Conservation Objectives for : Silvermines Mountains West SAC [002258]

### 4010 Northern Atlantic wet heaths with *Erica tetralix*

**To maintain the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Silvermines Mountains West SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Northern Atlantic wet heaths with <i>Erica tetralix</i> has not been mapped in detail for Silvermines Mountains West SAC and thus the total area of the qualifying habitat in the SAC is unknown. Wet heath is the main habitat in Silvermines Mountains West SAC. The habitat is well-developed and shows good transitions to European dry heaths (4030), blanket bog and upland grassland in the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes on Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of wet heath vegetation communities within this SAC is unknown. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present within a 20m radius of each monitoring stop	Attribute and target based on Perrin et al. (2014). Cross-leaved heath is the only characteristic species of the habitat listed in European Commission (2013). Whilst it is seldom abundant in wet heaths, its presence at high frequencies is considered one of the few characteristics common between the varied communities of this habitat (JNCC, 2009)
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Positive indicator species recorded in the habitat in the SAC include ling ( <i>Calluna vulgaris</i> ), common cottongrass ( <i>Eriophorum angustifolium</i> ), tormentil ( <i>Potentilla erecta</i> ), cross-leaved heath ( <i>Erica tetralix</i> ), with a good layer of bog mosses ( <i>Sphagnum</i> spp., e.g. <i>Sphagnum capillifolium</i> and <i>S. papillosum</i> ) and pleurocarpous mosses, including <i>Hypnum cupressiforme</i> , present (NPWS internal files)
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Attribute and target based on Perrin et al. (2014). A plentiful lichen/bryophyte layer is characteristic of this habitat
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Attribute and target based on Perrin et al. (2014). A dwarf shrub layer with ericoid species is characteristic of this habitat (crowberry is only rarely present). Low cover of these species would be indicative of chronic overgrazing, burning, etc.
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Attribute and target based on Perrin et al. (2014). A dwarf shrub layer is characteristic of wet heaths, but the vegetation should be a mixture of dwarf shrub and graminoid species, with higher cover of dwarf shrubs being potentially indicative of drainage
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented

Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014). High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing or due to the habitat drying out
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note, however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014). High levels of disturbed <i>Sphagnum</i> would indicate undesirable levels of grazers
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human foot prints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014). Drainage can result in loss of characteristic species and transition to drier habitats
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	This includes species listed in the Flora (Protection) Order, 2015 (FPO) and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

## Conservation Objectives for : Silvermines Mountains West SAC [002258]

### 4030 European dry heaths

**To maintain the favourable conservation condition of European dry heaths in Silvermines Mountains West SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	European dry heaths has not been mapped in detail for Silvermines Mountains West SAC and thus the total area of the qualifying habitat in the SAC is unknown. Although small in area and well-scattered, dry heath is considered to be well-represented in the SAC. The habitat occurs in association with Northern Atlantic wet heaths with <i>Erica tetralix</i> (4010), blanket bog and upland grassland and is found on the more steeply sloping ground below the summit ridge and on outcropping rock exposures in the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of dry heath vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Attribute and target based on Perrin et al. (2014). Dry heath is not necessarily rich in lichen and bryophyte species, but a minimum amount should still be present
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. Positive indicator species recorded in the habitat in the SAC include western gorse ( <i>Ulex gallii</i> ), bell heather ( <i>Erica cinerea</i> ), ling ( <i>Calluna vulgaris</i> ) and bilberry ( <i>Vaccinium myrtillus</i> ) (NPWS internal files)
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Attribute and target based on Perrin et al. (2014). Bog-myrtle is indicative of flushed conditions and is more characteristic of wet heaths and blanket bogs. Creeping willow is more characteristic of dune heaths. Western gorse is a component of dry heath, but high proportions of it may indicate a history of undesirable levels of grazing
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014). High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing



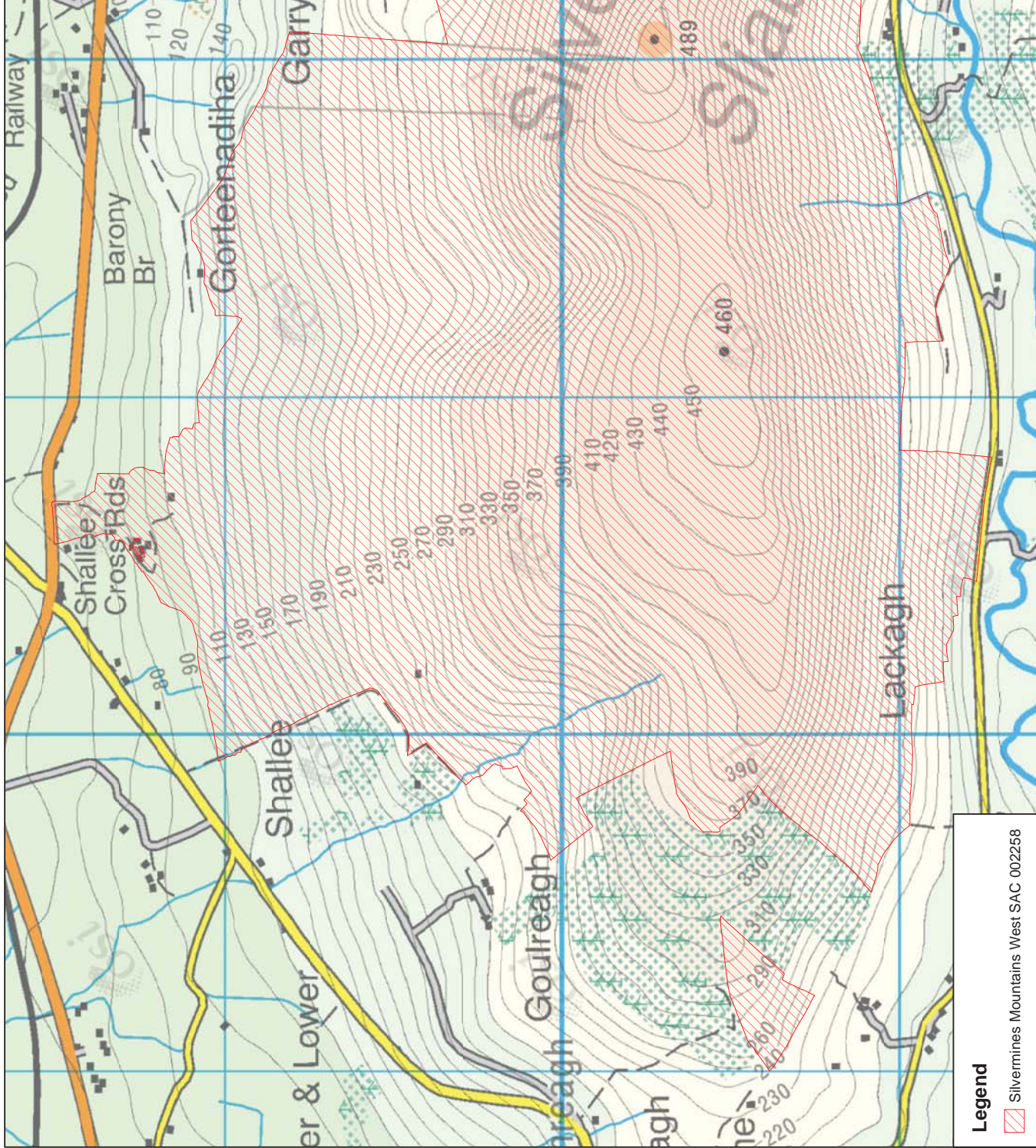
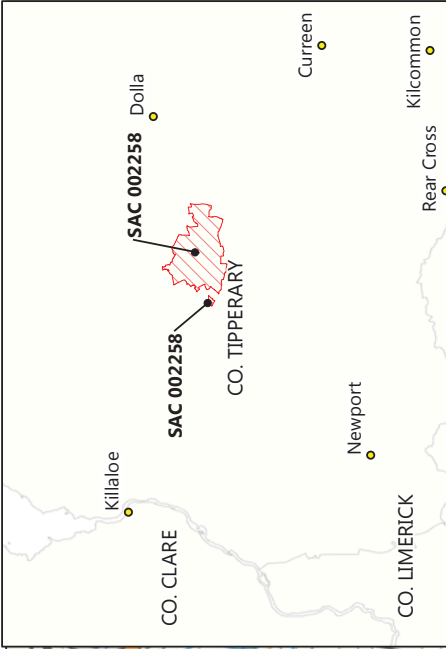
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note, however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%	Attribute and target based on Perrin et al. (2014). Senescence is part of the natural cycle of ling, but a dominance of ling in the senescent phase would indicate a lack of management (appropriate grazing or burning) to promote ling regeneration
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. Fires can be part of the natural cycle of heaths and may, under carefully controlled circumstances, be used as an occasional management tool to promote regeneration of, or diversity of growth phases, in ling ( <i>Calluna vulgaris</i> ). However, currently most hill fires in Ireland are intentionally started to encourage grass growth for livestock. Fires which are too intense, too frequent, too extensive or which occur in sensitive areas are damaging to the habitat
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. The growth phases of ling are pioneer (<10cm high), building (10-30cm high) and mature (<30cm high). As burning is undesirable in sensitive areas, it is not reasonable to require the stated diversity of growth phases within these areas
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human foot prints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

## Conservation Objectives for : Silvermines Mountains West SAC [002258]

### 6130 Calaminarian grasslands of the *Violetalia calaminariae*

**To maintain the favourable conservation condition of Calaminarian grasslands of the *Violetalia calaminariae* in Silvermines Mountains West SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	No decline, subject to natural processes	Calaminarian grasslands of the <i>Violetalia calaminariae</i> was surveyed in detail by Holyoak (2009) at Shallee within Silvermines Mountains West SAC where the area of the habitat is estimated to be 0.9ha
Distribution	Location	No decline, subject to natural processes. See map 3 for the surveyed point location at Shallee	Shallee is a former lead mine in the north of the SAC with extensive old lead mine workings and ore-processing works situated low on a north-facing slope near the west end of Silvermines Mountains. Calaminarian grassland is extensive and well-developed on the mine spoil at Shallee (Holyoak, 2009)
Physical structure: bare ground	Percentage cover	Maintain adequate open ground	At Shallee, the extent of bare soil and rock within four (50cm x 50cm) quadrats (recorded in 2008) ranged between c.3% and 50% (Holyoak, 2009)
Soil toxicity: heavy metal content	µg/g dry weight soil	Maintain high levels of the heavy metals copper and lead in soil	The total copper content in a sample of mine spoil taken from Shallee in 2009 was 4,998.5µg/g dry weight and the total lead content was 24,473µg/g dry weight (Campbell, 2013). Mine spoil with similar vegetation from Cornwall had available copper of 151–3,220µg/g dry weight (Holyoak et al., 2000; Walsh, 2001)
Vegetation structure: height and cover	Centimetres; percentage cover	Maintain low and open vegetation	At Shallee, herbaceous vegetation height was recorded within four (50cm x 50cm) quadrats (in 2008) as quite short (0-8cm) and vascular plant cover was low (0-10%). Bryophyte cover was relatively high (11-75%) (Holyoak, 2009)
Vegetation composition: metallophyte bryophytes	Number	Maintain diversity and populations of metallophyte bryophytes	The liverwort <i>Cephaloziella nicholsonii</i> , which is listed on the Flora (Protection) Order, 2015 (FPO) and classified as Vulnerable (Lockhart et al., 2012) occurs at Shallee, as does the Near Threatened <i>C. stellulifera</i> (Holyoak, 2009; Lockhart et al., 2012). The largest of the four Irish populations of the Endangered and FPO listed moss <i>Ditrichum plumbicola</i> (Lockhart et al., 2012) is also found at Shallee (Holyoak, 2009)



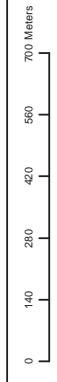
**Legend**

-  Silvermines Mountains West SAC 002258



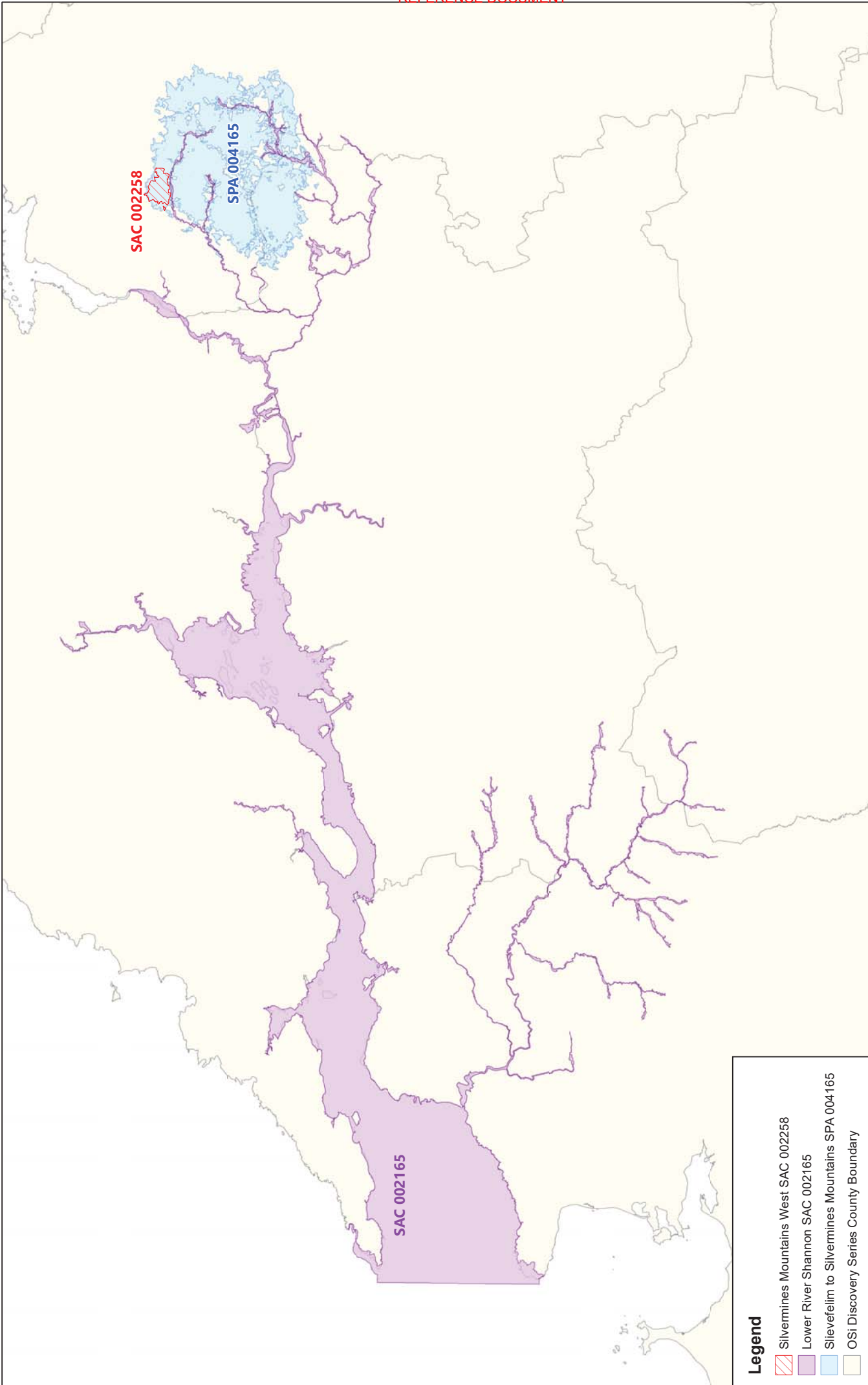
**MAP 1:**  
**SILVERMINES MOUNTAINS WEST SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
 SAC 002258; version 3.01. CO. TIPPERARY







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 Níl sna teorainneacha ar na léarscálanna ach nód gashuomhach, ginearálta. Feadar athbheithithe a déanamh ar theorainneacha na gceantar comharthaí. Surbhíaracha Oidhreachta Úrnh EN 0059216. © Surbhíaracha Oidhreachta na hÉireann Rialtas na hÉireann





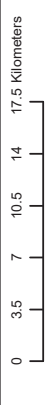
**Legend**

-  Silvermines Mountains West SAC 002258
-  Lower River Shannon SAC 002165
-  Slievefelim to Silvermines Mountains SPA 004165
-  OSI/Discovery Series County Boundary



**MAP 2:**  
**SILVERMINES MOUNTAINS WEST SAC**  
**CONSERVATION OBJECTIVES**  
**OVERLAPPING DESIGNATION**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
 SAC 002258; version 3.01; SAC 002165; version 3.01;  
 SPA 004165; version 3.  
**CO. TIPPERARY / CO. LIMERICK**

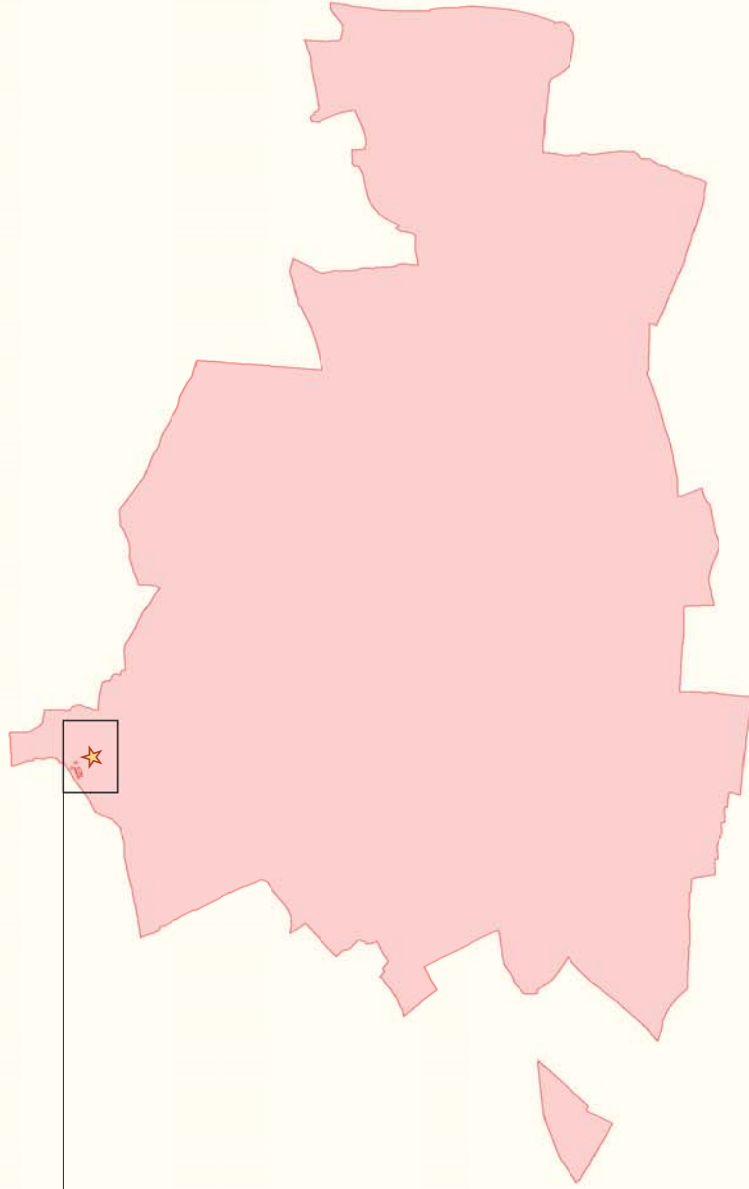


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**Map Version 1**  
**Date: July 2017**

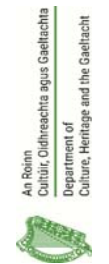


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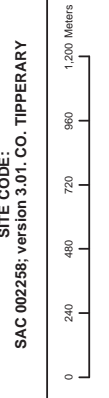


**Legend**

- ★ 6130 Calaminarian grasslands of the *Violetalia calaminariae*
- Silvermines Mountains West SAC 002258
- OSi Discovery Series County Boundaries



**MAP 3:**  
**SILVERMINES MOUNTAINS WEST SAC**  
**CONSERVATION OBJECTIVES**  
**CALAMINARIAN GRASSLAND**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document.



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# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Philipston Marsh SAC 001847



An Roinn  
Cultúir, Oidhreachta agus Gaeltachta

Department of  
Culture, Heritage and the Gaeltacht



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**Citation:**

**NPWS (2018) Conservation Objectives: Philipston Marsh SAC 001847. Version 1.  
National Parks and Wildlife Service, Department of Culture, Heritage and the  
Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.



## Qualifying Interests

*\* indicates a priority habitat under the Habitats Directive*

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001847 Philipston Marsh SAC

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7140 Transition mires and quaking bogs

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1992
<b>Title :</b>	A report on the wetland vegetation of the Mulkear River catchment, Cos Limerick and Tipperary
<b>Author :</b>	Lockhart, N.D.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2013
<b>Title :</b>	Conservation status assessments for three fen habitat types - 7230, 7210 and 7140
<b>Author :</b>	Kimberley, S.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS

### Other References

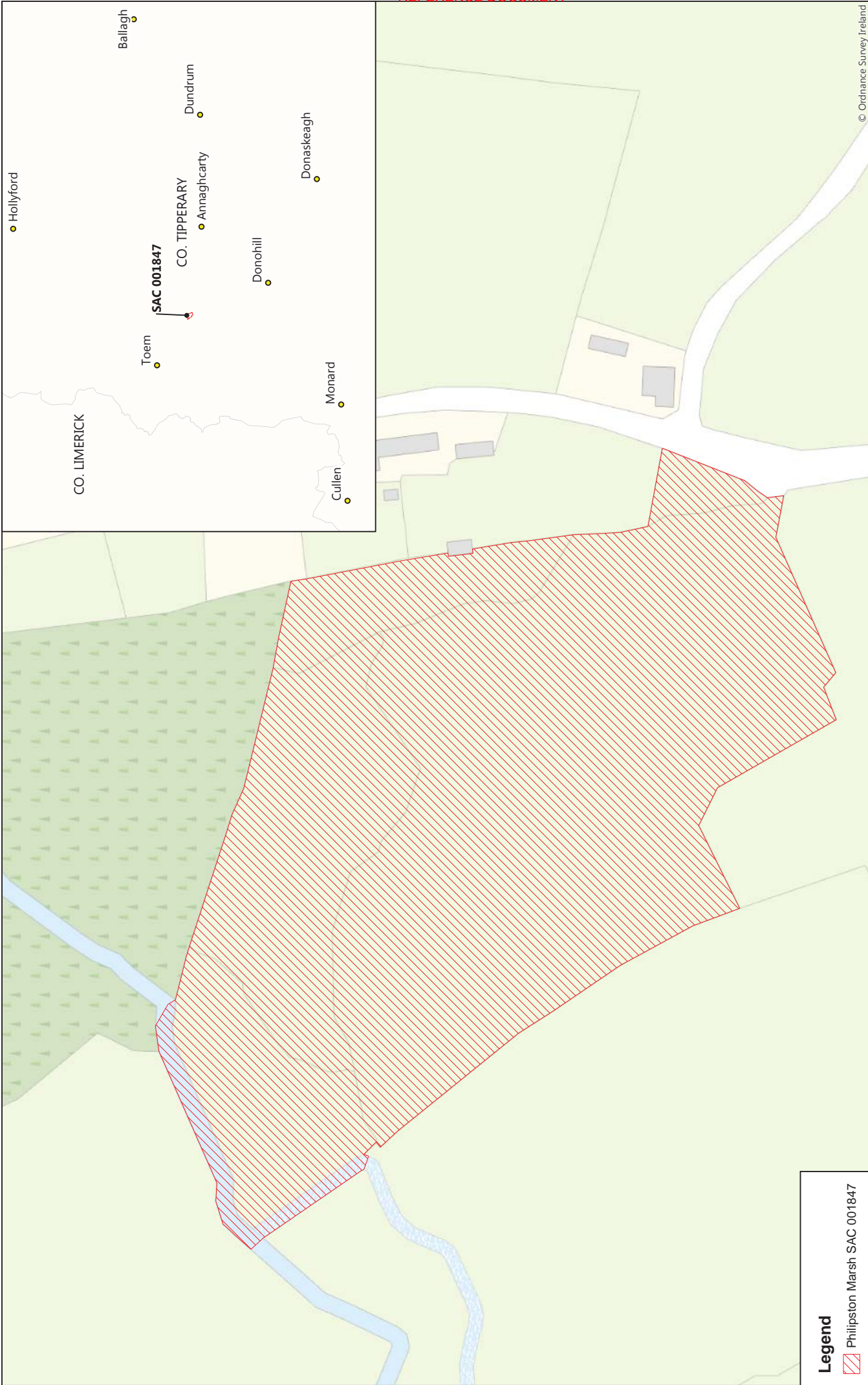
<b>Year :</b>	2004
<b>Title :</b>	Common Standards Monitoring guidance for lowland wetland habitats
<b>Author :</b>	JNCC
<b>Series :</b>	Joint Nature Conservation Committee, Peterborough
<b>Year :</b>	2011
<b>Title :</b>	Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop, Noordwijkerhout, 23-25 June 2010
<b>Author :</b>	Bobbink, R.; Hettelingh, J.P.
<b>Series :</b>	RIVM report 680359002, Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM)

**Conservation Objectives for : Philipston Marsh SAC [001847]****7140 Transition mires and quaking bogs**

**To maintain the favourable conservation condition of Transition mires and quaking bogs in Philipston Marsh SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Transition mires and quaking bogs has not been mapped in detail for Philipston Marsh SAC and thus the total area of the qualifying habitat in the SAC is unknown. Philipston Marsh SAC supports an important, though small, example of transition mire in the Mulkear River catchment, a region in which the habitat is rare. It occurs as a distinct habitat within the SAC and also in mosaic with alkaline fen and in association with reed swamp and ombrotrophic vegetation (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes on Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013). See also Bobbink and Hettelingh (2011)
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - water levels	Centimetres; duration of water levels	Maintain appropriate water levels necessary to support the natural structure and functioning of the habitat	Maintenance of a permanently high water level, remaining close to the peat surface all year, with water level fluctuations within natural ranges, is required for this wetland habitat. See Kimberley (2013)
Ecosystem function: hydrology - flow patterns	Flow direction	Maintain appropriate topography and water movement regime necessary to support the natural structure and functioning of the habitat	Maintenance, both within and surrounding the habitat, of topography and flow patterns within natural ranges is essential in order to ensure the hydrological integrity of this wetland habitat. A calcareous spring at the base of a gentle slope, close to the eastern boundary, flushes the southern part of the SAC with calcarous groundwater (Lockhart, 1992; NPWS internal files)
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The surface water conditions necessary to maintain transition mires range from acidic to slightly base-rich. The vegetation typically has intimate mixtures of species considered to be acidophile and others considered calciphile. In other cases, these intermediate properties may reflect the actual process of succession, as peat accumulates in groundwater-fed fen or open water to produce rainwater-fed bog isolated from groundwater influence. The calcareous nature of the spring in the SAC is due to the extensive limestone aquifer within the region (NPWS internal files)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of transition mire vegetation communities in this SAC is unknown. Information on vegetation communities associated with this habitat in the uplands is presented in Perrin et al. (2014)

Vegetation composition: typical vascular plants and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical vascular plant and bryophyte species	For lists of typical plant species see the Article 17 conservation status assessment for transition mires and quaking bogs (NPWS, 2013) and the fen habitats supporting document (Kimberley, 2013). See also Perrin et al. (2014) and JNCC (2004). In this SAC, typical vascular plant species recorded in the habitat include lesser tussock-sedge ( <i>Carex diandra</i> ), common sedge ( <i>C. nigra</i> ), bottle sedge ( <i>C. rostrata</i> ), bogbean ( <i>Menyanthes trifoliata</i> ) and marsh lousewort ( <i>Pedicularis palustris</i> ). Bryophytes recorded in the habitat in the SAC include <i>Campylium stellatum</i> , <i>Scorpidium revolvens</i> , <i>Ctenidium molluscum</i> , <i>Fissidens adianthoides</i> , <i>Philonotis calcarea</i> and <i>Palustriella commutata</i> (Lockhart, 1992; NPWS internal files)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable impacts such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. Native negative indicator species that could suggest drying out include ling ( <i>Calluna vulgaris</i> ) and birch ( <i>Betula pubescens</i> )
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances. Giant hogweed ( <i>Heracleum mantegazzianum</i> ) has been recorded in the SAC (NPWS internal files)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014). Drainage can result in loss of characteristic species and transition to drier habitats
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground not more than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human foot prints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). Species found in the habitat in the SAC that are regionally uncommon include broad-leaved cottongrass ( <i>Eriophorum latifolium</i> ), marsh helleborine ( <i>Epipactis palustris</i> ) and fen bedstraw ( <i>Galium uliginosum</i> ). The bryophytes listed above are largely confined to Philipston Marsh SAC within the Mulkear River catchment (Lockhart, 1992; NPWS internal files)



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Map Version 1  
Date: Aug 2017

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SITE CODE:  
SAC 001847; version 3.01. CO. TIPPERARY

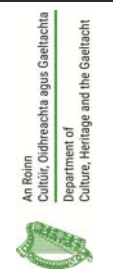


MAP 1:  
PHILIPSTON MARSH SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**Legend**

Philipston Marsh SAC 001847



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Kilduff, Devilsbit Mountain SAC 000934



An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

**National Parks and Wildlife Service,  
Department of Culture, Heritage and the Gaeltacht,  
90 King Street North, Dublin 7, D07 N7CV, Ireland.**

**Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@chg.gov.ie](mailto:nature.conservation@chg.gov.ie)**

**Citation:**

**NPWS (2018) Conservation Objectives: Kilduff, Devilsbit Mountain SAC 000934.  
Version 1. National Parks and Wildlife Service, Department of Culture, Heritage  
and the Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.



## Qualifying Interests

*\* indicates a priority habitat under the Habitats Directive*

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000934	Kilduff, Devilsbit Mountain SAC
4030	European dry heaths
6230	Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*

## Supporting documents, relevant reports & publications

*Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)*

### NPWS Documents

<b>Year :</b>	2007
<b>Title :</b>	Grasslands monitoring project 2006
<b>Author :</b>	Dwyer, R.; Crowley, W.; Wilson, F.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS

## Conservation Objectives for : Kilduff, Devilsbit Mountain SAC [000934]

### 4030 European dry heaths

**To maintain the favourable conservation condition of European dry heaths in Kilduff, Devilsbit Mountain SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	European dry heaths has not been mapped in detail for Kilduff, Devilsbit Mountain SAC and thus the total area of the qualifying habitat in the SAC is unknown. This upland SAC contains small areas of good quality dry heath on the upper slopes and summit of Devilsbit Mountain (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain pH and soil nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of dry heath vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Attribute and target based on Perrin et al. (2014). Dry heath is not necessarily rich in lichen and bryophyte species, but a minimum amount should still be present
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. The positive indicator species bilberry ( <i>Vaccinium myrtillus</i> ), bell heather ( <i>Erica cinerea</i> ) and ling ( <i>Calluna vulgaris</i> ) have been recorded in dry heath in this SAC (NPWS internal files)
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Attribute and target based on Perrin et al. (2014). Bog-myrtle is indicative of flushed conditions and is more characteristic of wet heaths and blanket bogs. Creeping willow is more characteristic of dune heaths. Western gorse is a component of dry heath, but high proportions of it may indicate a history of undesirable levels of grazing
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014). High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community

Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note, however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%	Attribute and target based on Perrin et al. (2014). Senescence is part of the natural cycle of ling, but a dominance of ling in the senescent phase would indicate a lack of management (appropriate grazing or burning) to promote ling regeneration
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. Fires can be part of the natural cycle of heaths and may, under carefully controlled circumstances, be used as an occasional management tool to promote regeneration of, or diversity of growth phases, in ling ( <i>Calluna vulgaris</i> ). However, currently most hill fires in Ireland are intentionally started to encourage grass growth for livestock. Fires which are too intense, too frequent, too extensive or which occur in sensitive areas are damaging to the habitat
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. The growth phases of ling are pioneer (<10cm high), building (10-30cm high) and mature (<30cm high). As burning is undesirable in sensitive areas, it is not reasonable to require the stated diversity of growth phases within these areas
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

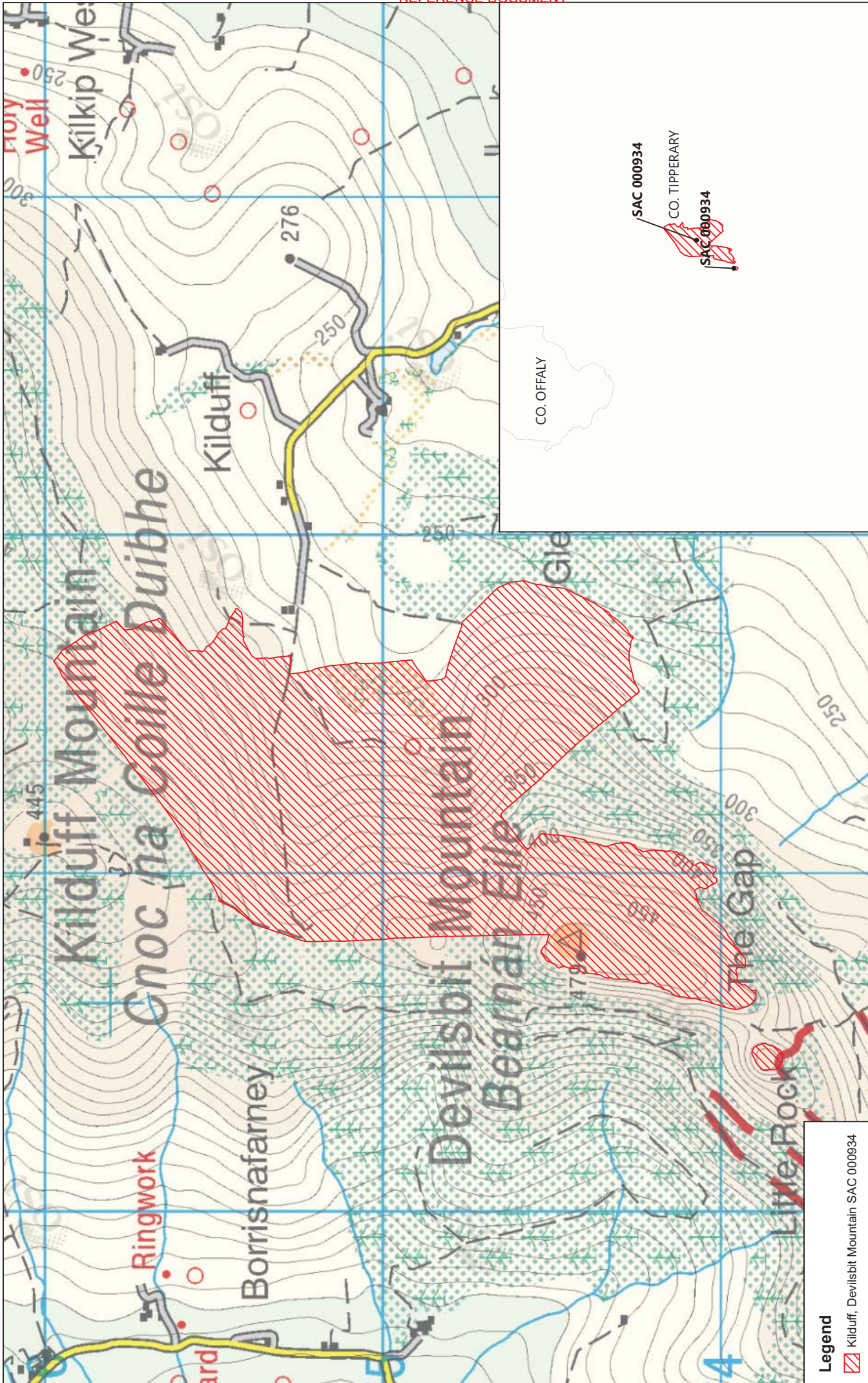
**Conservation Objectives for : Kilduff, Devilsbit Mountain SAC [000934]**

**6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)**

**To restore the favourable conservation condition of Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)\* in Kilduff, Devilsbit Mountain SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The total area of species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* in Kilduff, Devilsbit Mountain SAC is currently unknown. The habitat is largely confined to unimproved mineral soils on the lower slopes and, where mineral soil is present, the habitat also stretches uphill. Species-rich <i>Nardus</i> grassland* is sometimes found in a mosaic with heathy grassland in the SAC (NPWS internal files). As part of the Grasslands Monitoring Project 2006, Dwyer et al. (2007) surveyed the habitat in the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of species-rich <i>Nardus</i> grassland* vegetation communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Positive indicator species recorded in the habitat in the SAC by Dwyer et al. (2007) include mat-grass ( <i>Nardus stricta</i> ), common bent-grass ( <i>Agrostis capillaris</i> ), sweet vernal-grass ( <i>Anthoxanthum odoratum</i> ), tormentil ( <i>Potentilla erecta</i> ), sheep's-fescue ( <i>Festuca ovina</i> ), heath bedstraw ( <i>Galium saxatile</i> ), heath wood-rush ( <i>Luzula multiflora</i> ) and the moss <i>Rhytidiadelphus squarrosus</i>
Vegetation composition: high quality indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least two high quality indicator species for base-rich examples of the habitat and at least one for base-poor examples of the habitat	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: species richness	Number of species at a representative number of 2m x 2m monitoring stops	Species richness at each monitoring stop at least 25	Attribute and target based on Perrin et al. (2014). Species richness is a key characteristic of species-rich <i>Nardus</i> grasslands (6230*) which distinguishes it from species-poor <i>Nardus</i> swards that are very common in the uplands of Ireland and the UK. Vascular plant, bryophyte and lichen species are counted
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than or equal to 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of negative indicator species individually less than or equal to 10% and collectively less than or equal to 20%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented

Vegetation composition: <i>Sphagnum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Sphagnum</i> species less than or equal to 10%	Attribute and target based on Perrin et al. (2014). High cover of <i>Sphagnum</i> mosses would not be characteristic of species-rich <i>Nardus</i> grasslands* and may indicate changes in hydrology or soil nutrients within the habitat, but is more likely to indicate that the community is inherently a marginal example of the habitat
Vegetation composition: <i>Polytrichum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Polytrichum</i> species less than or equal to 25%	Attribute and target based on Perrin et al. (2014). High cover of <i>Polytrichum</i> mosses would not be characteristic of species-rich <i>Nardus</i> grasslands* and may indicate changes in hydrology or soil nutrients within the habitat, but is more likely to indicate that the community is inherently a marginal example of the habitat
Vegetation composition: shrubs, bracken and heath cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of shrubs, bracken ( <i>Pteridium aquilinum</i> ) and heath collectively less than or equal to 5%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community, and high cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing. Dwyer et al. (2007) reported encroachment by bracken ( <i>Pteridium aquilinum</i> ), and also by species such as hawthorn ( <i>Crataegus monogyna</i> ), bramble ( <i>Rubus fruticosus</i> ) and gorse ( <i>Ulex europaeus</i> ), in the habitat in the SAC
Vegetation structure: forb to graminoid ratio	Percentage cover at a representative number of 2m x 2m monitoring stops	Forb component of forb:graminoid ratio is 20-90%	Attribute and target based on Perrin et al. (2014). Forb richness is characteristic of conservation value swards. Dwyer et al. (2007) reported agricultural improvement and reseeded with perennial rye-grass ( <i>Lolium perenne</i> ) in parts of the habitat in the SAC
Vegetation structure: sward height	Sward height at a representative number of 2m x 2m monitoring stops	Proportion of the sward between 5cm and 50cm tall is at least 25%	Attribute and target based on Perrin et al. (2014). The lower and upper height limits are set to record overgrazing and undergrazing respectively
Vegetation structure: litter cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of litter less than or equal to 20%	Attribute and target based on Perrin et al. (2014). High levels of leaf litter can be indicative of undergrazing and rank swards, with a resulting impact on species richness
Physical structure: disturbed bare ground	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than or equal to 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on Perrin et al. (2014). Serious overgrazing and disturbance can impact on species richness, nutrient status and soil stability
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 (FPO) and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The FPO listed and Vulnerable small-white orchid ( <i>Pseudorchis albida</i> ) (Wyse Jackson et al., 2016) has been recorded in the habitat in the SAC (NPWS internal files), but was not found during the survey by Dwyer et al. (2007)



**Legend**

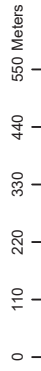
 Kilduff, Devilsbit Mountain SAC 000934

An Roinn Cultúir,  
Oifigeacha agus Gastrachta  
Department of Culture,  
Heritage and the Gaeltacht

**MAP 1:**  
**KILDUFF, DEVILSBIT MOUNTAIN SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
SAC 000934; version 3.01. CO. TIPPERARY



The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Ordnance Survey of Ireland Licence No EN 0069216. © Ordnance Survey of Ireland Government of Ireland.

Níl sna teorainneacha ar na léarscálteanna ach nod garshuíomhach ginearálta. Fáidtar athbheithníth a déanamh ar theorainneacha na gceantar comhairle. Surbhíearachta Oronála na hÉireann Ceardúnas Úmhl EN 0069216. © Surbhíearachta Oronála na hÉireann Rialtas na hÉireann



Map Version 1  
Date: June 2018

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Clare Glen SAC 000930



An Roinn  
Cultúir, Oidhreachta agus Gaeltachta  

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Department of  
Culture, Heritage and the Gaeltacht





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## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

000930	Clare Glen SAC
1421	Killarney Fern <i>Trichomanes speciosum</i>
91A0	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles

Please note that this SAC is adjacent to Comer River Shallow SAC  
 adjacent to Slieve Eli to Silver Linn Mountain SAC  
 See also The Conservation Objectives for this site should be used in  
 consultation with those for the adjacent sites as appropriate

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1971
<b>Title :</b>	A Report of Areas of Scientific Interest in County Limerick
<b>Author :</b>	Young, R.
<b>Series :</b>	Unpublished report
<b>Year :</b>	2008
<b>Title :</b>	National survey of native woodlands 2003-2008
<b>Author :</b>	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2010
<b>Title :</b>	A provisional inventory of ancient and long-established woodland in Ireland
<b>Author :</b>	Perrin, P.M.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manual No. 46
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2015
<b>Title :</b>	Monitoring methods for the Killarney fern ( <i>Trichomanes speciosum</i> Willd.) in Ireland
<b>Author :</b>	Ní Dhúill, E.; Smyth, N.; Waldren, S.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No. 82
<b>Year :</b>	undated
<b>Title :</b>	A Preliminary Report on Areas of Scientific Interest in County Tipperary (N.R.)
<b>Author :</b>	Fahy, E.
<b>Series :</b>	Unpublished Report

### Other References

<b>Year :</b>	2002
<b>Title :</b>	Reversing the habitat fragmentation of British woodlands
<b>Author :</b>	Peterken, G.
<b>Series :</b>	WWF-UK, London
<b>Year :</b>	2012
<b>Title :</b>	Rare and threatened bryophytes of Ireland
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	National Museums Northern Ireland

## Spatial data sources

<b>Year :</b>	Revision 2010
<b>Title :</b>	National Survey of Native Woodlands 2003-2008. Version 1
<b>GIS Operations :</b>	QI selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	91A0 (map 3)

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## Conservation Objectives for : Clare Glen SAC [000930]

### 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

To restore the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in Clare Glen SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The woodland in Clare Glen SAC occurs along the Clare River valley and is of mixed composition with native broadleaves and non-native conifers and beech ( <i>Fagus sylvatica</i> ). As part of the National Survey of Native Woodlands (NSNW), the sub-site Clare Glen (NSNW site code 1286) was surveyed by Perrin et al. (2008). The minimum area of old oak woodland in the SAC is estimated to be 17.93ha. Map 3 shows the surveyed woodland classified as 91A0 (17.93ha) by Perrin et al. (2008) in the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3 for surveyed area	Distribution based on Perrin et al. (2008)
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Sessile oak ( <i>Quercus petraea</i> ) generally regenerates poorly. In suitable sites, ash ( <i>Fraxinus excelsior</i> ) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (Perrin and Daly, 2010), archaeological and geological features as well as red-data and other rare or localised species. Clare Glen (NSNW site code 1286) has been classified as possible ancient woodland by Perrin and Daly (2010). The Near Threatened liverworts <i>Dumortiera hirsuta</i> and <i>Lejeunea eckloniana</i> (Lockhart et al., 2012) are associated with wet rocks in the river, shaded by the woodland in the SAC (NPWS internal files). The rare Myxomycete fungi <i>Fuligo muscorum</i> , <i>Stemonitopsis hyperopta</i> and <i>Licea testudinacea</i> are present in the woodland and the Annex II listed Killarney fern ( <i>Trichomanes speciosum</i> ) has also been recorded (NPWS internal files). See also the conservation objective for Killarney fern (1421) in this volume
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including sessile oak ( <i>Quercus petraea</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008) and NPWS internal files. See also Young (1971) and Fahy (undated)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common non-native invasive species in this woodland type: beech ( <i>Fagus sylvatica</i> ), sycamore ( <i>Acer pseudoplatanus</i> ) and rhododendron ( <i>Rhododendron ponticum</i> ). Parts of Clare Glen have been planted with conifers ( <i>Abies</i> , <i>Picea</i> and <i>Pinus</i> spp.). Beech, rhododendron and cherry laurel ( <i>Prunus laurocerasus</i> ) also occur in the woodland in the SAC (Perrin et al., 2008; NPWS internal files)

## Conservation Objectives for : Clare Glen SAC [000930]

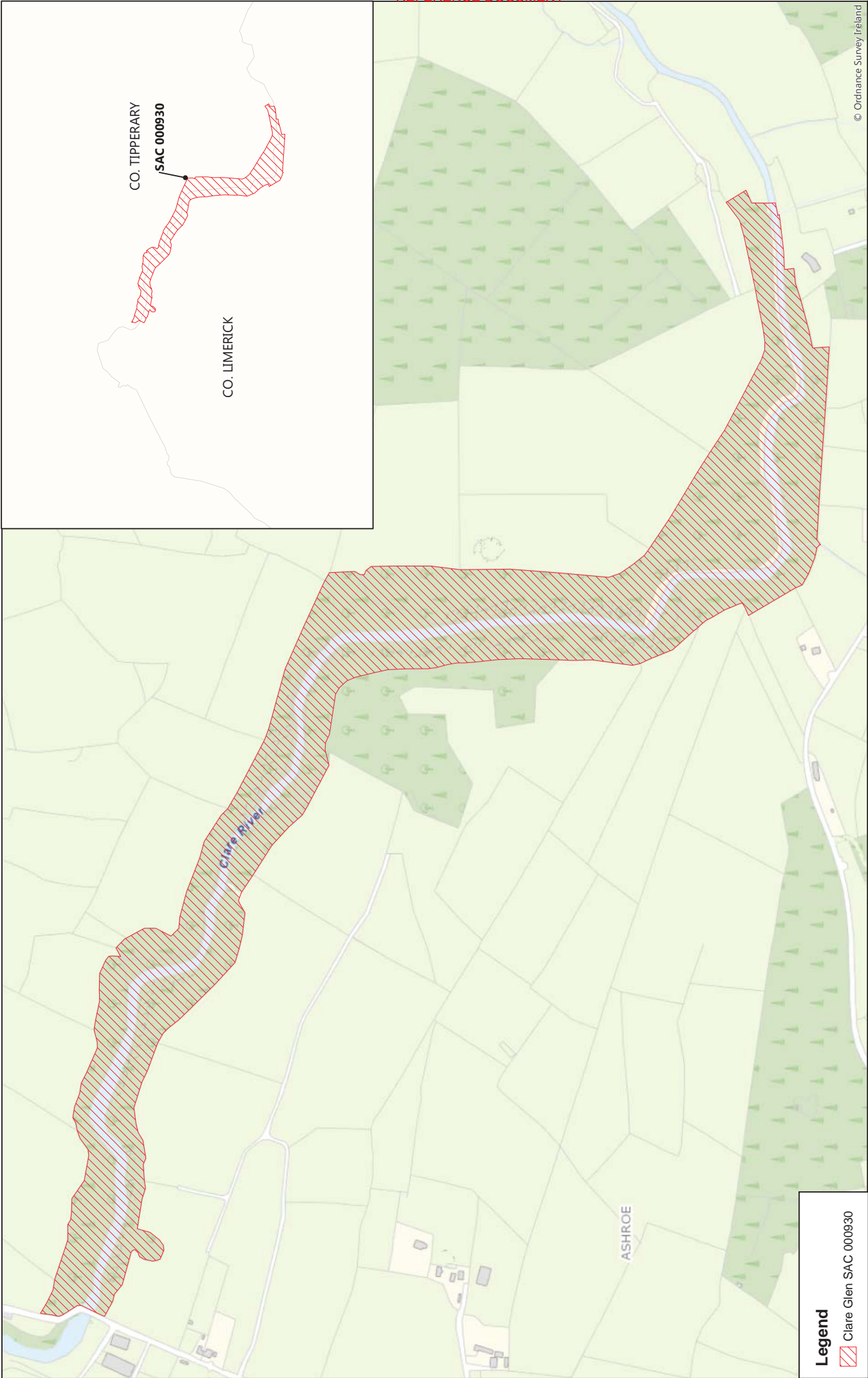
### 1421 Killarney Fern *Trichomanes speciosum*

**To maintain the favourable conservation condition of Killarney Fern in Clare Glen SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Occurrence	No loss in geographical spread of populations, subject to natural processes	The population of Killarney fern ( <i>Trichomanes speciosum</i> ) is currently known from several locations in Clare Glen SAC, all within hectad R75. Exact locations are not mapped here on account of the threat posed by illegal collecting. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Number of populations	Number	No decline, subject to natural processes	One population of the species has been recorded in the SAC since 1960. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Number of colonies	Number	No decline, subject to natural processes	Eleven colonies of the species have been recorded from the population in the SAC since 1960. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population: life-cycle stage	Type (sporophyte or gametophyte)	Maintain life-cycle stage composition of populations, subject to natural processes	Three of the eleven colonies recorded since 1960 are composed of sporophytes (frond stage), all of which have co-existing gametophytes (filamentous stage), and eight are composed of gametophytes only. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population size: area of occupancy	Square metres	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population size: living sporophyte fronds	Number	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: young and unfurling fronds	Occurrence	Young (not fully expanded) and/or unfurling (crozier) fronds present in populations previously observed to have these, subject to natural processes	Young and/or unfurling fronds have been recorded from Clare Glen SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: fertile fronds	Occurrence	Fertile fronds present in populations previously observed to have these, subject to natural processes	Fertile fronds have been recorded from the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: juvenile sporophyte fronds emerging from gametophytes	Number	No decline, subject to natural processes	Juvenile sporophyte fronds emerging from gametophytes have been recorded from the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Habitat extent	Hectares	No loss of suitable habitat, subject to natural processes	The species grows in deeply shaded, humid situations - dripping caves, overhangs and crevices on cliffs, rocky slopes, by waterfalls, in stream ravines and gullies, on rock or soil banks in woodlands and, occasionally, under fallen trees and on the floor of damp woodlands. Whilst also occurring in these habitats, the gametophyte stage can grow in drier areas that do not suit the sporophyte. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: wet/damp microhabitats	Occurrence	Maintain hydrological conditions at the locations of known populations - visible water source, with dripping or seeping water present and/or substrate wet/damp to touch, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files



Hydrological conditions: relative humidity	Percentage	Maintain relative humidity levels at known colonies at not less than 80%, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: desiccated fronds	Number	No increase, subject to natural processes	Presence of desiccated sporophyte fronds and gametophyte mats is indicative of unsuitable conditions. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Light levels: shading	Shade index score	At least 4 for woodland sporophyte-only and mixed colonies; at least 5 for open upland sporophyte-only and mixed colonies; at least 6 for gametophyte-only colonies, subject to natural processes	Shade Index: 4. Moderate shade, e.g. light-medium deciduous canopy with sun flecks. 5. Permanently shaded from direct sunlight but otherwise open to sky. 6. Deep woodland (e.g. coniferous or in ravine) shade, no sun flecks. 7. Perpetual deep shade, e.g. cave entrance, beneath boulder. The species occurs in moderate to deep shade in woodland in Clare Glen SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Woodland canopy cover	Percentage	No loss of woodland canopy at, or in the vicinity of, the locations of known populations and canopy cover here maintained at more than 33%, subject to natural processes	Woodland management at or near to locations of known populations of the species must take account of its habitat requirements, particularly with regard to maintenance of sufficient canopy cover. The species occurs in woodland in Clare Glen SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Invasive species	Occurrence	Maintain absence of invasive non-native and vigorous native plant species at the locations of known populations or, if present, maintain vegetation cover of these at less than 10%, taking into account the habitat requirements of <i>T. speciosum</i>	In order to avoid negative impacts on the Killarney fern ( <i>Trichomanes speciosum</i> ), its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.) must be taken into account in locations that are subject to or proposed for management actions to control invasive non-native and/or vigorous native plant species. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files



**Legend**

 Clare Glen SAC 000930



**MAP 1:  
CLARE GLEN SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 000930; version 3.01.  
CO. TIPPERARY / CO. LIMERICK**



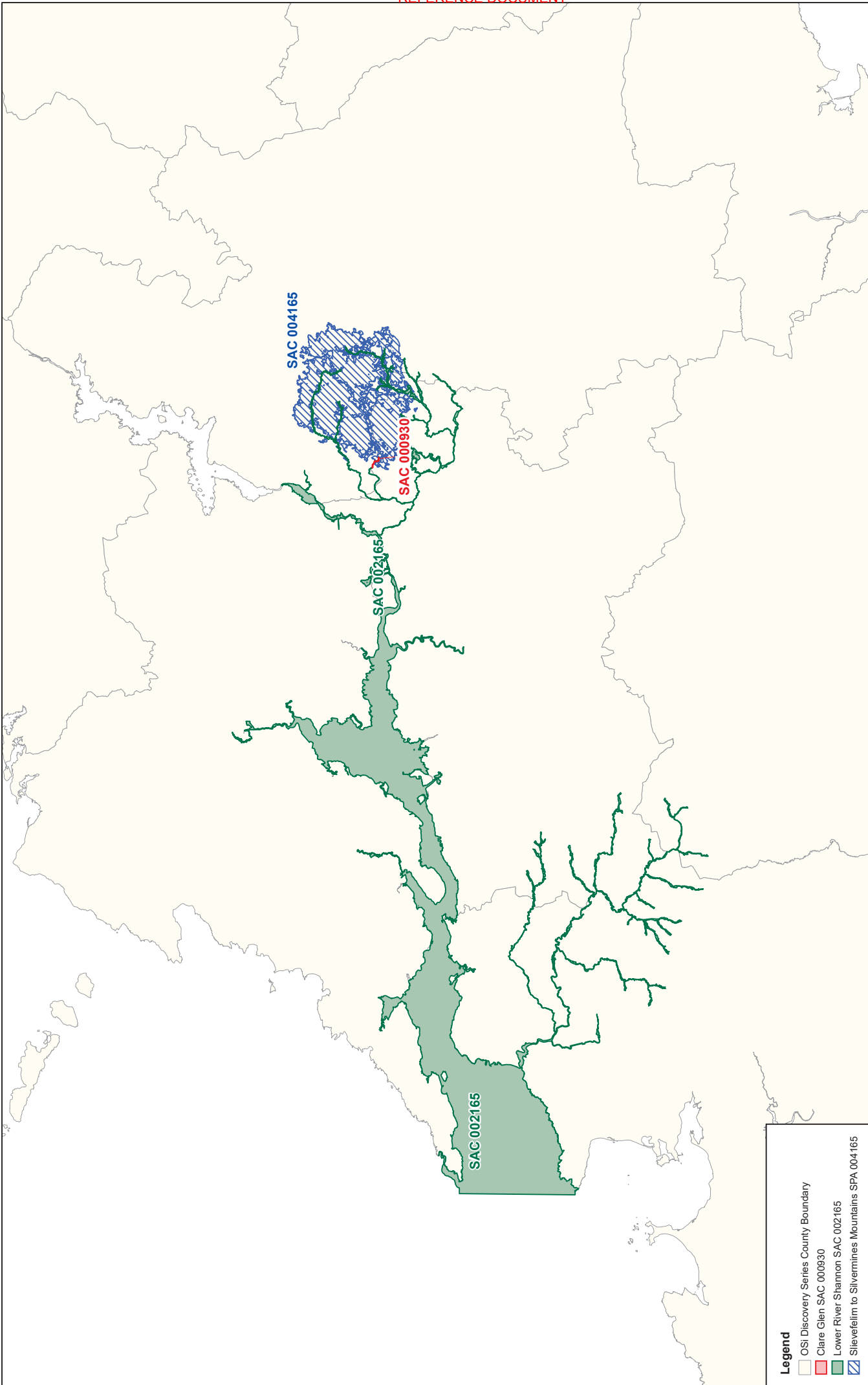
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscálteanna ach níos gnáthluomhach ginearálta. Fáidtar athbheithníthe a dhéanamh ar theorainneacha na gceantar comhthartha. Suirbhíreachta Oibríocht na hÉireann Ceardúnas Úrinn EN 0069216. © Suirbhíreachta Oibríocht na hÉireann Rialtas na hÉireann







**Map Version 1**  
**Date: Nov 2017**

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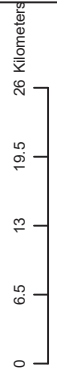
**Legend**

-  OSI Discovery Series County Boundary
-  Clare Glen SAC 000930
-  Lower River Shannon SAC 002165
-  Slieveilim to Silvermines Mountains SPA 004165



**MAP 2:**  
**CLARE GLEN SAC**  
**CONSERVATION OBJECTIVES ADJACENT**  
**ADJOINING AND OVERLAPPING DESIGNATIONS**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE: SAC 000930; version 3.01.**  
**SAC 002165; version 3.02. SPA 004165; version 3.**  
**CO. TIPPERARY / CO. LIMERICK**

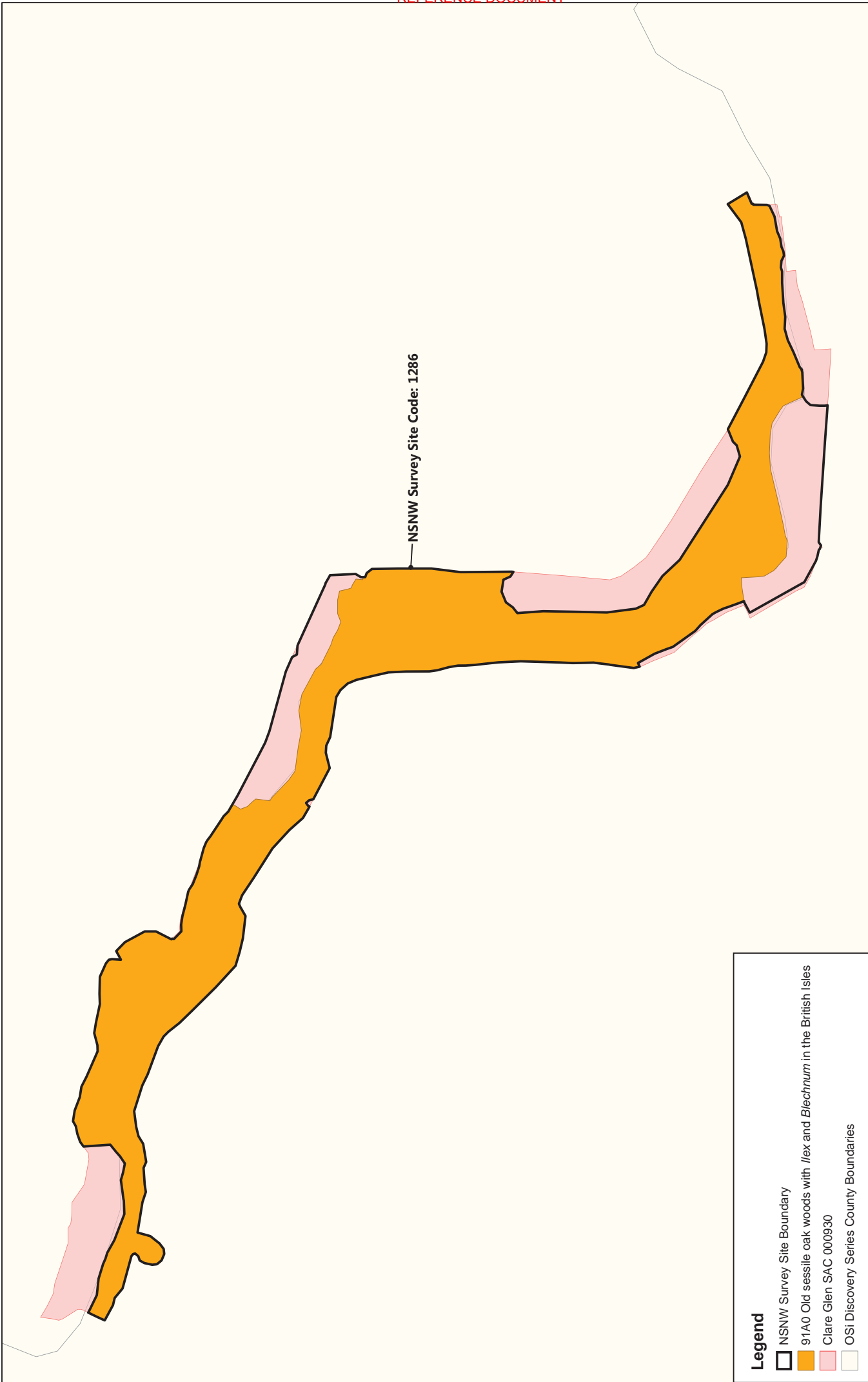


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscálteanna ach níos ginearálta ach níos ginearálta. Fágáil atá bfuil bfuil na cúlraí ar theorainneacha na gceantar comhtharlaithe. Suirbhíaracha Oidhreachta agus Gaeltachta. © Suirbhíaracha Oidhreachta agus Gaeltachta. Rialtas na hÉireann

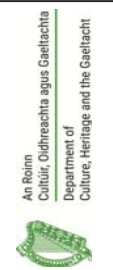


**Map Version 1**  
**Date: Nov 2017**



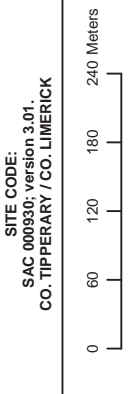
**Legend**

-  NSNW Survey Site Boundary
-  91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
-  Clare Glen SAC 000930
-  OSI/Discovery Series County Boundaries



**MAP 3:**  
**CLARE GLEN SAC**  
**CONSERVATION OBJECTIVES**  
**WOODLAND HABITATS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.



The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Glenstal Wood SAC 001432



An Roinn  
Cultúir, Oidhreachta agus Gaeltachta

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Department of  
Culture, Heritage and the Gaeltacht



**National Parks and Wildlife Service,  
Department of Culture, Heritage and the Gaeltacht,  
90 King Street North, Dublin 7, D07 N7CV, Ireland.**

**Web: [www.npws.ie](http://www.npws.ie)  
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**Citation:**

**NPWS (2018) Conservation Objectives: Glenstal Wood SAC 001432. Version 1.  
National Parks and Wildlife Service, Department of Culture, Heritage and the  
Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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001432      Glenstal Wood SAC

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1421      Killarney Fern *Trichomanes speciosum*

Please note that this SAC is adjacent to Slieve Eli to Silverlines  
 contains SAC. See map. The conservation objectives for  
 this site should be used in conjunction with those for the adjacent  
 site as appropriate.



## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<hr/>	
<b>Year :</b>	2015
<b>Title :</b>	Monitoring methods for the Killarney fern ( <i>Trichomanes speciosum</i> Willd.) in Ireland
<b>Author :</b>	Ní Dhúill, E.; Smyth, N.; Waldren, S.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No. 82
<hr/>	

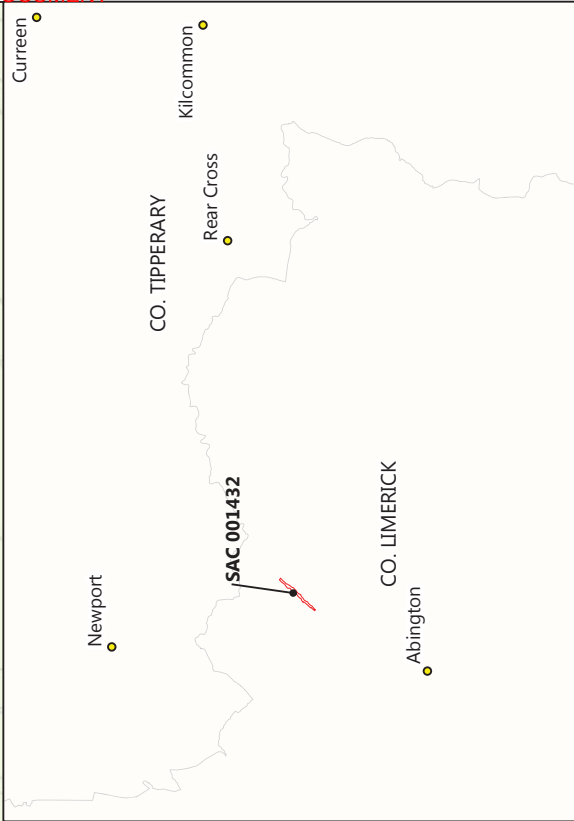
## Conservation Objectives for : Glenstal Wood SAC [001432]

### 1421 Killarney Fern *Trichomanes speciosum*

**To maintain the favourable conservation condition of Killarney Fern in Glenstal Wood SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Occurrence	No loss in geographical spread of populations, subject to natural processes	The population of Killarney fern ( <i>Trichomanes speciosum</i> ) is currently known from several locations in Glenstal Wood SAC, all within hectad R75. Exact locations are not mapped here on account of the threat posed by illegal collecting. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Number of populations	Number	No decline, subject to natural processes	One population of the species has been recorded in the SAC since 1960. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Number of colonies	Number	No decline, subject to natural processes	Eight colonies of the species have been recorded from the population in the SAC since 1960, seven of which were noted in 2016. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population: life-cycle stage	Type (sporophyte or gametophyte)	Maintain life-cycle stage composition of populations, subject to natural processes	Five of the eight colonies recorded since 1960 are composed of sporophytes (frond stage), of which four have co-existing gametophytes (filamentous stage), and three are composed of gametophytes only. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population size: area of occupancy	Square metres	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population size: living sporophyte fronds	Number	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: young and unfurling fronds	Occurrence	Young (not fully expanded) and/or unfurling (crozier) fronds present in populations previously observed to have these, subject to natural processes	Young and/or unfurling fronds have been recorded from Glenstal Wood SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: fertile fronds	Occurrence	Fertile fronds present in populations previously observed to have these, subject to natural processes	Fertile fronds have been recorded from the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: juvenile sporophyte fronds emerging from gametophytes	Number	No decline, subject to natural processes	Juvenile sporophyte fronds emerging from gametophytes have not been recorded from the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Habitat extent	Hectares	No loss of suitable habitat, subject to natural processes	The species grows in deeply shaded, humid situations - dripping caves, overhangs and crevices on cliffs, rocky slopes, by waterfalls, in stream ravines and gullies, on rock or soil banks in woodlands and, occasionally, under fallen trees and on the floor of damp woodlands. Whilst also occurring in these habitats, the gametophyte stage can grow in drier areas that do not suit the sporophyte. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: wet/damp microhabitats	Occurrence	Maintain hydrological conditions at the locations of known populations - visible water source, with dripping or seeping water present and/or substrate wet/damp to touch, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files

Hydrological conditions: relative humidity	Percentage	Maintain relative humidity levels at known colonies at not less than 80%, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: desiccated fronds	Number	No increase, subject to natural processes	Presence of desiccated sporophyte fronds and gametophyte mats is indicative of unsuitable conditions. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Light levels: shading	Shade index score	At least 4 for woodland sporophyte-only and mixed colonies; at least 5 for open upland sporophyte-only and mixed colonies; at least 6 for gametophyte-only colonies, subject to natural processes	Shade Index: 4. Moderate shade, e.g. light-medium deciduous canopy with sun flecks. 5. Permanently shaded from direct sunlight but otherwise open to sky. 6. Deep woodland (e.g. coniferous or in ravine) shade, no sun flecks. 7. Perpetual deep shade, e.g. cave entrance, beneath boulder. The species occurs in moderate to deep shade in woodland in Glenstal Wood SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Woodland canopy cover	Percentage	No loss of woodland canopy at, or in the vicinity of, the locations of known populations and canopy cover here maintained at more than 33%, subject to natural processes	Woodland management at or near to locations of known populations of the species must take account of its habitat requirements, particularly with regard to maintenance of sufficient canopy cover. The species occurs in woodland in Glenstal Wood SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Invasive species	Occurrence	Maintain absence of invasive non-native and vigorous native plant species at the locations of known populations or, if present, maintain vegetation cover of these at less than 10%, taking into account the habitat requirements of <i>T. speciosum</i>	In order to avoid negative impacts on the Killarney fern ( <i>Trichomanes speciosum</i> ), its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.) must be taken into account in locations that are subject to or proposed for management actions to control invasive non-native and/or vigorous native plant species. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files



**Legend**

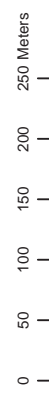
 Glenstal Wood SAC 001432



**MAP 1:  
GLENSTAL WOOD SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 001432; version 3. CO. LIMERICK**

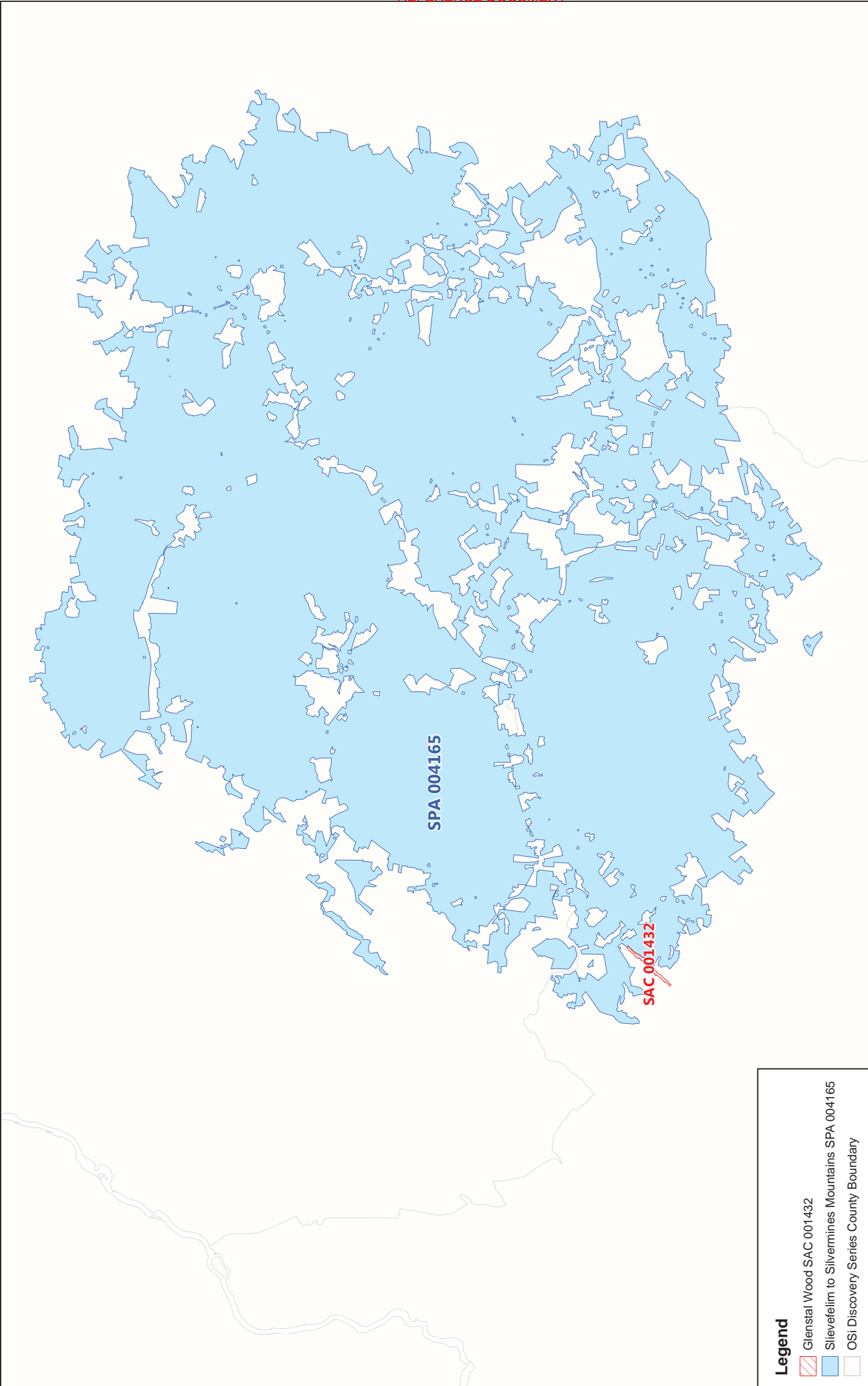


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**Map Version 1**  
Date: Nov 2017



**Legend**

-  Glenstal Wood SAC 001432
-  Slievefeilim to Silvermines Mountains SPA 004165
-  OSI/Discovery Series County Boundary

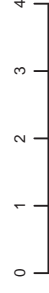
An Roinn  
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Department of  
Culture, Heritage and the Gaeltacht



**MAP 2:**  
**GLENSTAL WOOD SAC**  
**CONSERVATION OBJECTIVES**  
**OVERLAPPING DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.


**SITE CODE:**  
**SAC 001432; version 3. SPA 004165; version 3.**  
**CO. LIMERICK, CO. TIPPERARY**



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**Map Version 1**  
**Date: Nov 2017**



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Slieve Bernagh Bog SAC 002312



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

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Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs



**National Parks and Wildlife Service,  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs,  
7 Ely Place, Dublin 2, Ireland.  
Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

**NPWS (2016) Conservation Objectives: Slieve Bernagh Bog SAC 002312. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.



## Qualifying Interests

*\* indicates a priority habitat under the Habitats Directive*

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002312	Slieve Bernagh Bog SAC
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
7130	Blanket bogs (* if active bog)

## Supporting documents, relevant reports & publications

*Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)*

### NPWS Documents

<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List no. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2016
<b>Title :</b>	Slieve Bernagh Bog SAC (site code: 2312) Conservation objectives supporting document-upland habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	1988
<b>Title :</b>	The Irish red data book 1. Vascular plants
<b>Author :</b>	Curtis, T.G.F; McGough, H.N.
<b>Series :</b>	Wildlife Service, Dublin
<b>Year :</b>	2001
<b>Title :</b>	Assessment of impacts on flora and fauna of a proposed wind farm development at Slieve Bearnagh, Co. Clare.
<b>Author :</b>	Biosphere Environmental Services (BES)
<b>Series :</b>	Unpublished report for O'Loughlin Environmental Services (OES), Tralee, Ireland

**Conservation Objectives for : Slieve Bernagh Bog SAC [002312]**

**4010 Northern Atlantic wet heaths with *Erica tetralix***

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Slieve Bernagh Bog SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Northern Atlantic wet heaths with <i>Erica tetralix</i> habitat has not been mapped in detail for Slieve Bernagh Bog SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 400ha. Further information can be found in BES (2001). Further details on this and the following attributes can be found in the Slieve Bernagh Bog SAC conservation objectives supporting document for uplands habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Areas of wet heath have been recorded throughout the SAC; information from the GIS files associated with NPWS (2013). Further information can be found within this source and the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The diversity of wet heath communities within this SAC is unknown. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of 2m x 2m monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present near each monitoring stop	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014), where the list of negative indicator species is also presented. See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of 2m x 2m monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage cover in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists, Curtis and McGough (1988) and Lockhart et al. (2012). See the uplands supporting document for further details

## Conservation Objectives for : Slieve Bernagh Bog SAC [002312]

### 4030 European dry heaths

**To restore the favourable conservation condition of European dry heaths in Slieve Bernagh Bog SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	European dry heaths have not been mapped in detail for Slieve Bernagh Bog SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 3ha. Further information can be found in BES (2001). Further details on this and the following attributes can be found in the Slieve Bernagh Bog SAC conservation objectives supporting document for upland habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Dry heath appears to be confined to the summits and steeper slopes within the SAC; information from the GIS files associated with NPWS (2013), and it has been recorded on the steep slopes of Moylussa by BES (2001). Further information can be found within these sources and the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The diversity of dry heath communities within this SAC is unknown. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. See the uplands supporting document for further details
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. See the uplands supporting document for further details
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014), where the list of negative indicator species is also presented. See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. See the uplands supporting document for further details
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists, Curtis and McGough (1988) and Lockhart et al. (2012). See the uplands supporting document for further details

## Conservation Objectives for : Slieve Bernagh Bog SAC [002312]

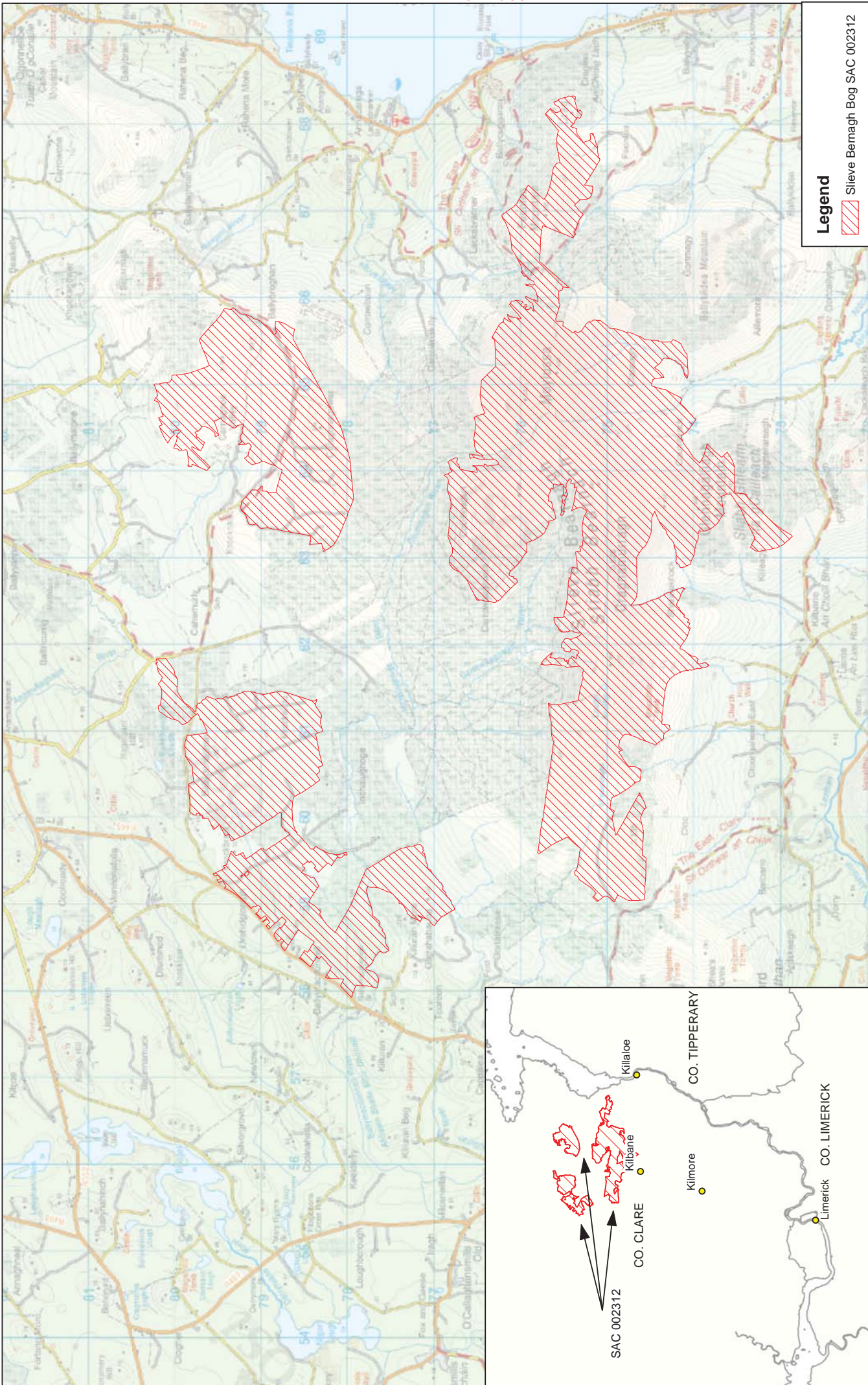
### 7130 Blanket bogs (\* if active bog)

**To restore the favourable conservation condition of Blanket bogs in Slieve Bernagh Bog SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Blanket bog has not been mapped in detail for Slieve Bernagh Bog SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 140ha. Further information can be found in BES (2001). Further details on this and the following attributes can be found in the Slieve Bernagh Bog SAC conservation objectives supporting document for upland habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Blanket bog has been recorded throughout the SAC; information from the GIS files associated with NPWS (2013). Further information can be found within this source and see above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Ecosystem function: peat formation	Active blanket bog as a proportion of the total area of Annex I blanket bog habitat	At least 99% of the total Annex I blanket bog area is active	See the uplands supporting document for further details
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Further details and a brief discussion of restoration potential is presented in the uplands supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	BES (2001) recorded two blanket bog communities within this SAC. See the uplands supporting document for more details. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least seven	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding <i>Sphagnum fallax</i> , at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 75%	Based on Perrin et al. (2014). See the uplands supporting document for further details, including the list of potentially dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details


Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: erosion	Occurrence in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists, Curtis and McGough (1988) and Lockhart et al. (2012). See the uplands supporting document for further details





**Legend**

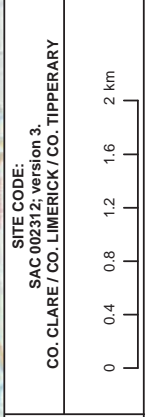
 Slieve Bernagh Bog SAC 002312

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Map Version 1  
Date: July 2016

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscálleanna ach rood garthuimhach ginearálta. Féadfar athbheithníthe a cleamhnú ar theorainneacha na gceantar comhairle. Surbhíearachta Ordónais na hÉireann Ceardúas Uimhí EN 0059216. © Surbhíearachta Ordónais na hÉireann



**MAP 1:**  
**SLIEVE BERNAGH BOG SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

An Roinn Éilinn, Oidhreacht,  
Gnóthaí Réigiúnacha, Tuathle agus Gaeltachta  
Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs





## Conservation objectives for Lough Derg, North-east Shore SAC [002241]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Code	Description
5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands
7210	Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae*
7230	Alkaline fens
8240	Limestone pavements*
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*
91J0	<i>Taxus baccata</i> woods of the British Isles*

\* denotes a priority habitat



**Citation:** *NPWS (2018) Conservation objectives for Lough Derg, North-east Shore SAC [002241].  
Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*

# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Glenomra Wood SAC 001013



An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

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Department of Culture, Heritage and the Gaeltacht,  
90 King Street North, Dublin 7, D07 N7CV, Ireland.**

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**Citation:**

**NPWS (2018) Conservation Objectives: Glenomra Wood SAC 001013. Version 1.  
National Parks and Wildlife Service, Department of Culture, Heritage and the  
Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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001013      Glenomra Wood SAC

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91A0      Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

## Supporting documents, relevant reports & publications

*Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)*

### NPWS Documents

<b>Year :</b>	1972
<b>Title :</b>	A preliminary report on Areas of Scientific Interest in County Clare
<b>Author :</b>	Goodwillie, R.N.
<b>Series :</b>	Unpublished report
<hr/>	
<b>Year :</b>	2008
<b>Title :</b>	National survey of native woodlands 2003-2008
<b>Author :</b>	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
<b>Series :</b>	Unpublished report to NPWS
<hr/>	
<b>Year :</b>	2010
<b>Title :</b>	A provisional inventory of ancient and long-established woodland in Ireland
<b>Author :</b>	Perrin, P.M.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manual No. 46
<hr/>	

### Other References

<b>Year :</b>	2002
<b>Title :</b>	Reversing the habitat fragmentation of British woodlands
<b>Author :</b>	Peterken, G.
<b>Series :</b>	WWF-UK, London
<hr/>	



## Spatial data sources

**Year :** Revision 2010

**Title :** National Survey of Native Woodlands 2003-2008. Version 1

**Series :** QI selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising

**Source :** 91A0 (map 2)

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## Conservation Objectives for : Glenomra Wood SAC [001013]

### 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

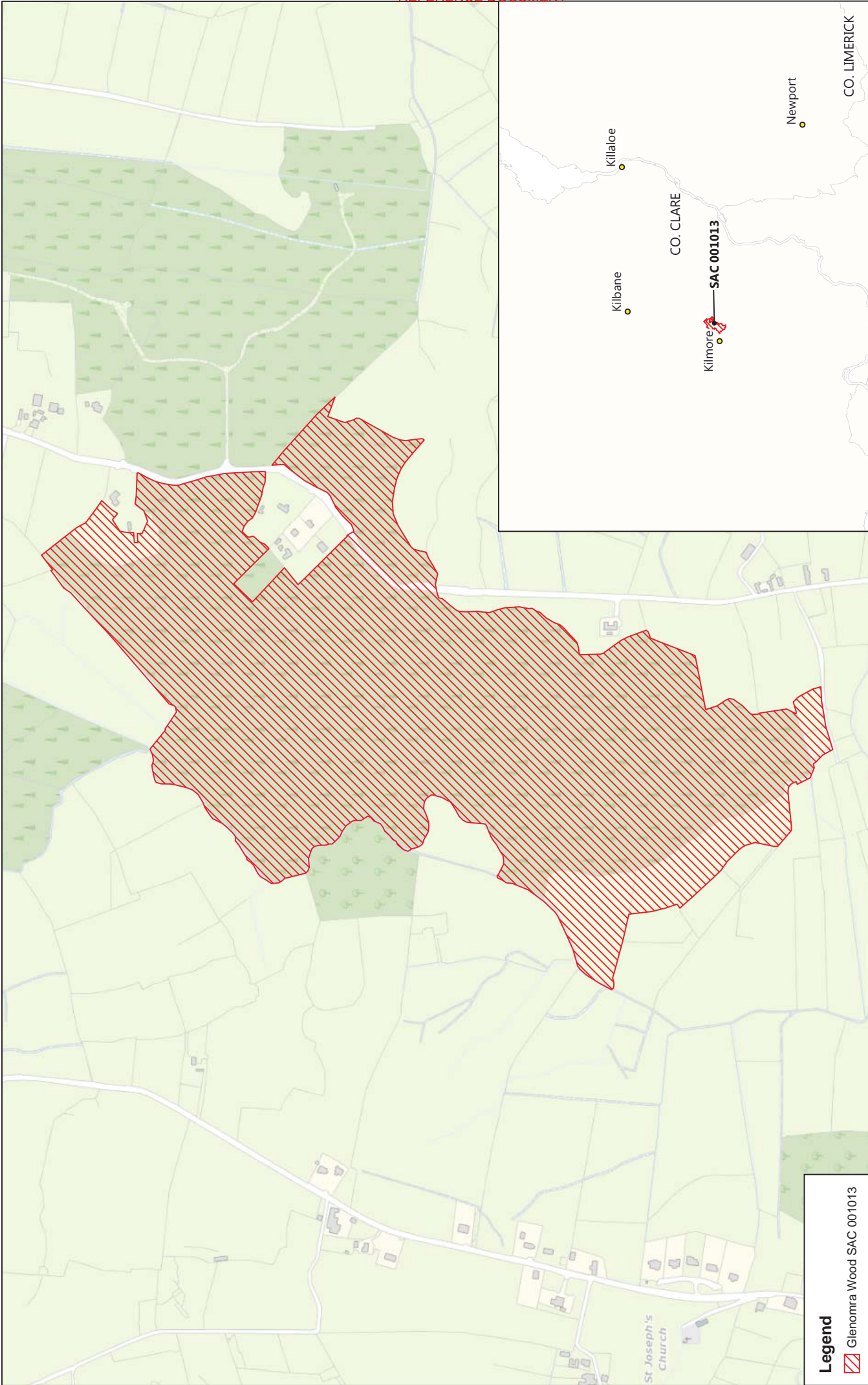
To maintain the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in Glenomra Wood SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes. See map 2 for surveyed woodland area	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles is present in Glenomra Wood and occurs in association with small areas of alluvial woodland and bog woodland in Glenomra Wood SAC. As part of the National Survey of Native Woodlands (NSNW), Glenomra Wood (NSNW site code 1555) was surveyed by Perrin et al. (2008). Map 2 shows the surveyed woodland (44.3ha) within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. The surveyed woodland is shown on map 2	Distribution based on Perrin et al. (2008)
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008)
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Sessile oak ( <i>Quercus petraea</i> ) generally regenerates poorly. In suitable sites, ash ( <i>Fraxinus excelsior</i> ) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (Perrin and Daly, 2010), archaeological and geological features as well as red data and other rare or localised species
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including sessile oak ( <i>Quercus petraea</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008). See also Goodwillie (1972)

REFERENCE DOCUMENT

Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common non-native invasive species in this woodland type: beech ( <i>Fagus sylvatica</i> ), sycamore ( <i>Acer pseudoplatanus</i> ) and rhododendron ( <i>Rhododendron ponticum</i> ). No non-native species were reported from Glenomra Wood (NSNW site code 1555) by Perrin et al. (2008)
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**Legend**

-  Glenomra Wood SAC 001013

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**MAP 1:  
GLENOMRA WOOD SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 001013; version 3.02 . CO. CLARE**

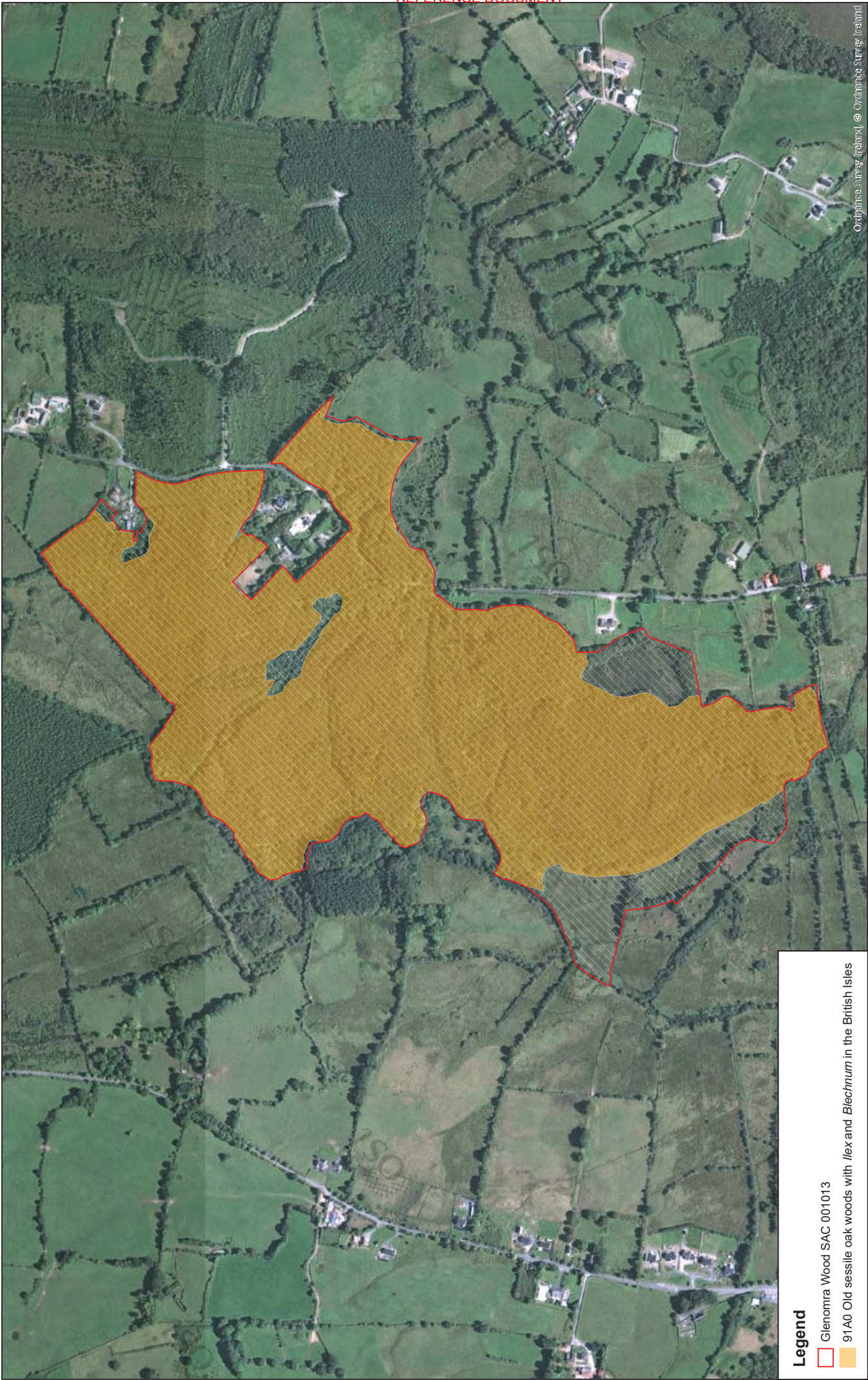
0 60 120 180 240 300 Meters

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Map Version 1  
Date: June 2018



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Map Version 1  
Date: June 2018

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscálteanna ach níos ginearálta ach níos ginearálta. Fágáid ar bheithinnibh a ginearálta ar theorainneacha na gceantar comhairle. Surbhíreachtá Ordónáil na hÉireann Ceadúnas Úrnl EN 0069216. © Surbhíreachtá Ordónáil na hÉireann Rialtas na hÉireann


SITE CODE:  
SAC 001013; version 3.02 . CO. CLARE

0 60 120 180 240 300 Meters

MAP 2:  
GLEMOMRA WOOD SAC  
CONSERVATION OBJECTIVES  
WOODLAND HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**Legend**

-  Glemomra Wood SAC 001013
-  91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles



An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

# National Parks and Wildlife Service

## *Conservation Objectives Series*

Tory Hill SAC 000439



An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

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## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.



## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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000439 Tory Hill SAC

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- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites)
- 7210 Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae\*
- 7230 Alkaline fens

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series :</b>	Irish Wildlife Manual No. 78
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2013
<b>Title :</b>	Irish semi-natural grasslands survey annual report No. 4: Western seaboard counties (Clare, Galway, Kerry, Limerick, Mayo) and County Tipperary
<b>Author :</b>	Devaney, F.M.; Martin, J.R.; O'Neill, F.H.; Delaney, A.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2013
<b>Title :</b>	Conservation status assessments for three fen habitat types - 7230, 7210 and 7140
<b>Author :</b>	Kimberley, S.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS

### Other References

<b>Year :</b>	2000
<b>Title :</b>	A guide to habitats in Ireland
<b>Author :</b>	Fossitt, J.A.
<b>Series :</b>	The Heritage Council, Kilkenny
<b>Year :</b>	2004
<b>Title :</b>	Common Standards Monitoring guidance for lowland wetland habitats
<b>Author :</b>	JNCC
<b>Series :</b>	Joint Nature Conservation Committee, Peterborough

<b>Year :</b>	2011
<b>Title :</b>	Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop, Noordwijkerhout, 23-25 June 2010
<b>Author :</b>	Bobbink, R.; Hettelingh, J.P.
<b>Series :</b>	RIVM report 680359002, Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM)
<b>Year :</b>	2014
<b>Title :</b>	Orchid Ireland Survey 2014
<b>Author :</b>	Curtis, T.; Wilson, F.
<b>Series :</b>	Report to National Museums Northern Ireland
<b>Year :</b>	2016
<b>Title :</b>	Eco-hydrological investigation of Tory Hill fen SAC, Co. Limerick
<b>Author :</b>	Regan S.; Conaghan J.
<b>Series :</b>	Report to The Office of Public Works

## Spatial data sources

Year:	2013
Title:	Irish Semi-Natural Grassland Survey
Source:	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Scale:	6210 (map 2)
Year:	2016
Title:	Eco-hydrological Investigation of Tory Hill Fen SAC, Co. Limerick
Source:	Dataset clipped to the SAC boundary. QIs identified. Expert opinion used as necessary to resolve any issues arising
Scale:	7210, 7230 (map 3)

**Conservation Objectives for : Tory Hill SAC [000439]**

**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites)**

**To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites) in Tory Hill SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	As part of the Irish Semi-natural Grassland Survey (ISGS) (Devaney et al., 2013; O'Neill et al., 2013), the habitat Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) was surveyed and mapped within the sub-site Toryhill (ISGS site code 2703) to give a minimum area of 0.95ha in Tory Hill SAC. Map 2 shows the surveyed grassland area classified as 6210 (0.95ha). NB further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 2 for the recorded distribution	Distribution based on O'Neill et al. (2013). The habitat occurs on the eastern side of Tory Hill mainly within a disused quarry (Devaney et al., 2013; O'Neill et al., 2013). NB further unsurveyed areas may be present within the SAC
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops	At least seven positive indicator species present, including two "high quality" species	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species, including high quality species, identified by the ISGS is also presented. High quality indicators recorded in the habitat in the SAC include quaking-grass ( <i>Briza media</i> ), crested hair-grass ( <i>Koeleria macrantha</i> ), kidney vetch ( <i>Anthyllis vulneraria</i> ) and cowslip ( <i>Primula veris</i> ). Positive indicators include wild thyme ( <i>Thymus polytrichus</i> ), mouse-ear hawkweed ( <i>Pilosella officinarum</i> ), lady's bedstraw ( <i>Galium verum</i> ) and common bird's-foot trefoil ( <i>Lotus corniculatus</i> ) (Devaney et al., 2013; O'Neill et al., 2013). Orchids recorded include bee orchid ( <i>Ophrys apifera</i> ), pyramidal orchid ( <i>Anacamptis pyramidalis</i> ), early-purple orchid ( <i>Orchis mascula</i> ), common spotted-orchid ( <i>Dactylorhiza fuchsii</i> ) and common twayblade ( <i>Neottia ovata</i> ) (Curtis and Wilson, 2014; NPWS internal files)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013), where the list of negative indicator species is also presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (except certain listed species) and bracken ( <i>Pteridium aquilinum</i> ) not more than 5% cover	Woody species that can occur above 5% cover are juniper ( <i>Juniperus communis</i> ), burnet rose ( <i>Rosa spinosissima</i> ), mountain avens ( <i>Dryas octopetala</i> ) and hoary rock-rose ( <i>Helianthemum oelandicum</i> ). However, cover of these species above 25% may indicate transition to another Annex I habitat such as Alpine and Boreal heaths (4060) or <i>Juniperus communis</i> formations (5130). Attribute and target based on O'Neill et al. (2013). In this SAC, scrub encroachment occurs in parts of the disused quarry and may threaten the orchid-rich grassland habitat in the long-term (Devaney et al., 2013; O'Neill et al., 2013; Curtis and Wilson, 2014)
Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013)

Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013)
Physical structure: disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or other disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013)

**Conservation Objectives for : Tory Hill SAC [000439]**

**7210 Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae**

**To maintain the favourable conservation condition of Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae\* in Tory Hill SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae* in Tory Hill SAC was surveyed by Regan and Conaghan (2016). The indicative area of the qualifying priority habitat in the SAC is c.0.9ha. The habitat occurs in association with the Annex I habitat Alkaline fens (habitat code 7230) in the SAC. See Regan and Conaghan (2016) for further details
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution based on Regan and Conaghan (2016). Areas of <i>Cladium</i> fen occur scattered through the wetland area between Tory Hill and Lough Nagirra in the SAC. See map 3 which shows the indicative area of <i>Cladium</i> fen in the SAC
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels. See Regan and Conaghan (2016) for details on the hydrology of Tory Hill SAC
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions	Drainage, either within or surrounding the fen habitat, can result in the drawdown of the fen groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats. See Regan and Conaghan (2016) for details on the hydrology of Tory Hill SAC
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should also be relatively calcium-rich. In this SAC, the habitat typically occurs in old wet cutaways where there is some influence of upwelling, base-enriched water (Regan and Conaghan, 2016). See Regan and Conaghan (2016) for further details
Vegetation composition: typical species	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical species, including brown mosses and vascular plants	For lists of typical plant species, see the Article 17 conservation status assessment for <i>Cladium</i> fens (NPWS, 2013) and the Article 17 fen habitats supporting document (Kimberley, 2013). In Tory Hill SAC, great fen-sedge ( <i>Cladium mariscus</i> ) is well-represented in the habitat. Other typical species occurring include water mint ( <i>Mentha aquatica</i> ), blunt-flowered rush ( <i>Juncus subnodulosus</i> ) and common marsh-bedstraw ( <i>Galium palustre</i> ) (Regan and Conaghan, 2016)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable impacts such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. See JNCC (2004) and Kimberley (2013)

Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014). Scrub and trees will tend to invade if fen conditions become drier
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground not more than 10%. Where tufa is present, disturbed bare ground not more than 1%	Attribute and target based on Perrin et al. (2014). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)



**Conservation Objectives for : Tory Hill SAC [000439]**

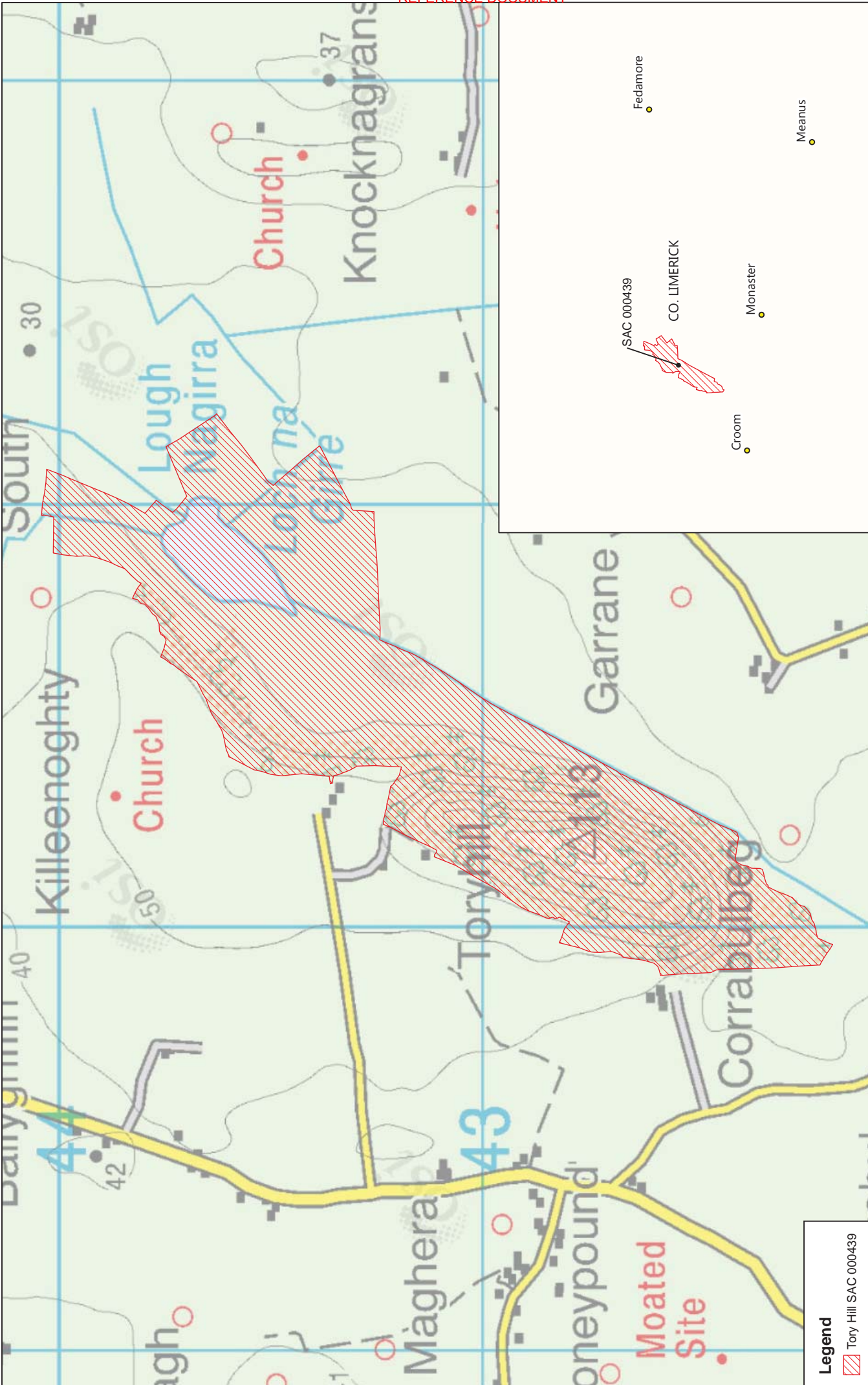
**7230 Alkaline fens**

**To restore the favourable conservation condition of Alkaline fens in Tory Hill SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alkaline fen in Tory Hill SAC was surveyed by Regan and Conaghan (2016). The indicative area of alkaline fen in the SAC is c.0.6ha, and that of alkaline fen in mosaic with marsh (Fossitt (2000) habitat GM1) is c.7.4ha. The habitat also occurs in association with the priority Annex I habitat Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae (habitat code 7210) in the SAC. See Regan and Conaghan (2016) for further details
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution based on Regan and Conaghan (2016). The areas of alkaline fen are concentrated in old wet cutaways close to the bottom of the slope of Tory Hill (Regan and Conaghan, 2016) and occur scattered through the wetland area between Tory Hill and Lough Nagirra in the SAC. See map 3 which shows the indicative area of alkaline fen, including in mosaic with marsh (GM1; Fossitt, 2000), in the SAC
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013). See also Bobbink and Hettelingh (2011)
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels. In this SAC, Regan and Conaghan (2016) found that the hydraulic gradient is not strong enough to maintain groundwater levels in most areas of the fen in the SAC and there is not enough groundwater getting to the surface for a sufficient period of the year. As such, alkaline fen vegetation is concentrated in old wet cutaways where the upwelling, base-enriched water is at or above the ground surface for the majority of the year. See Regan and Conaghan (2016) for further details
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions	Drainage, either within or surrounding the fen habitat, can result in the drawdown of the alkaline fen groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats. The main arterial drain, which borders the eastern boundary of the fen and flows south-west from Lough Nagirra, was found to be drawing down the groundwater levels of the fen in the SAC (Regan and Conaghan, 2016). See Regan and Conaghan (2016) for further details

Ecosystem function: water quality	Water chemistry measures	Maintain, or where necessary restore, appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should also be relatively calcium-rich. In Tory Hill SAC, alkaline fen vegetation is confined to areas where the past removal of surface vegetation, possibly scraw-cutting, has allowed base-rich groundwater to reach the surface (Regan and Conaghan, 2016)
Community diversity	Abundance of variety of vegetation communities	Maintain, or where necessary restore, variety of vegetation communities, subject to natural processes	See Regan and Conaghan (2016) for details on the vegetation communities in Tory Hill SAC. Information on vegetation communities associated with this habitat in the uplands is presented in Perrin et al. (2014)
Vegetation composition: brown mosses	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain, or where necessary restore, adequate cover of typical brown moss species	Typical brown moss species include <i>Bryum pseudotriquetrum</i> , <i>Calliergonella cuspidata</i> , <i>Calliergon giganteum</i> , <i>Campyllum stellatum</i> , <i>Cratoneuron filicinum</i> , <i>Ctenidium molluscum</i> , <i>Fissidens adianthoides</i> , <i>Palustriella commutata</i> , <i>Scorpidium cossonii</i> , <i>S. revolvens</i> and <i>S. scorpioides</i> . Regan and Conaghan (2016) recorded <i>Calliergonella cuspidata</i> , <i>C. giganteum</i> and <i>Campyllum stellatum</i> , but overall found that brown moss species were either absent or very rare in the habitat in the SAC, possibly due to periods of low water levels. See Regan and Conaghan (2016) for further details
Vegetation composition: typical vascular plants	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain, or where necessary restore, adequate cover of typical vascular plant species	For lists of typical plant species see the Article 17 conservation status assessment for alkaline fens (NPWS, 2013) and the fen habitats supporting document (Kimberley, 2013). See also Perrin et al. (2014) and JNCC (2004). In this SAC, Regan and Conaghan (2016) recorded an area of the habitat dominated by blunt-flowered rush ( <i>Juncus subnodulosus</i> ), with other typical species including water mint ( <i>Mentha aquatica</i> ) and marsh helleborine ( <i>Epipactis palustris</i> ). In an area dominated by black bog-rush ( <i>Schoneus nigricans</i> ) and purple moor-grass ( <i>Molinia caerulea</i> ), the typical species meadow thistle ( <i>Cirsium dissectum</i> ), carnation sedge ( <i>Carex panicea</i> ) and devil's-bit scabious occur (Regan and Conaghan, 2016). However, the habitat is relatively species-poor and the absence/low cover of the majority of indicator species suggests that the fen habitat in the SAC is relatively poorly-developed (Regan and Conaghan, 2016)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable impacts such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. Native negative indicators may include graminoids such as reed canary-grass ( <i>Phalaris arundinacea</i> ) and reed sweet-grass ( <i>Glyceria maxima</i> ), tall herbs such as great willowherb ( <i>Epilobium hirsutum</i> ), bracken ( <i>Pteridium aquilinum</i> ), bramble ( <i>Rubus fruticosus</i> ) and common nettle ( <i>Urtica dioica</i> ), and bryophytes such as <i>Brachythecium rutabulum</i> and <i>Kindbergia praelonga</i>
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014). Scrub and trees will tend to invade if fen conditions become drier

Vegetation composition: soft rush and common reed cover	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of soft rush ( <i>Juncus effusus</i> ) and common reed ( <i>Phragmites australis</i> ) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: litter	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of litter not more than 25%	Attribute and target based on JNCC (2004). More than 25% litter cover may indicate insufficient removal of biomass by grazing and/or undesirable water table levels
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground not more than 10%	Attribute and target based on Perrin et al. (2014). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion of peatlands. A small area of alkaline fen to the north-west of Lough Nagirra has been damaged by poaching in recent years, although overall levels of grazing in the habitat in the SAC appear to be low (Regan and Conaghan, 2016)
Physical structure: tufa formations	Percentage cover in local vicinity of a representative number of monitoring stops	Disturbed proportion of vegetation cover where tufa is present is less than 1%	Attribute and target based on Perrin et al. (2014)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)



**Legend**

 Tory Hill SAC 000439

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**MAP 1:**  
**TORY HILL SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**  
Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
SAC 000439; version 3.01; CO. LIMERICK

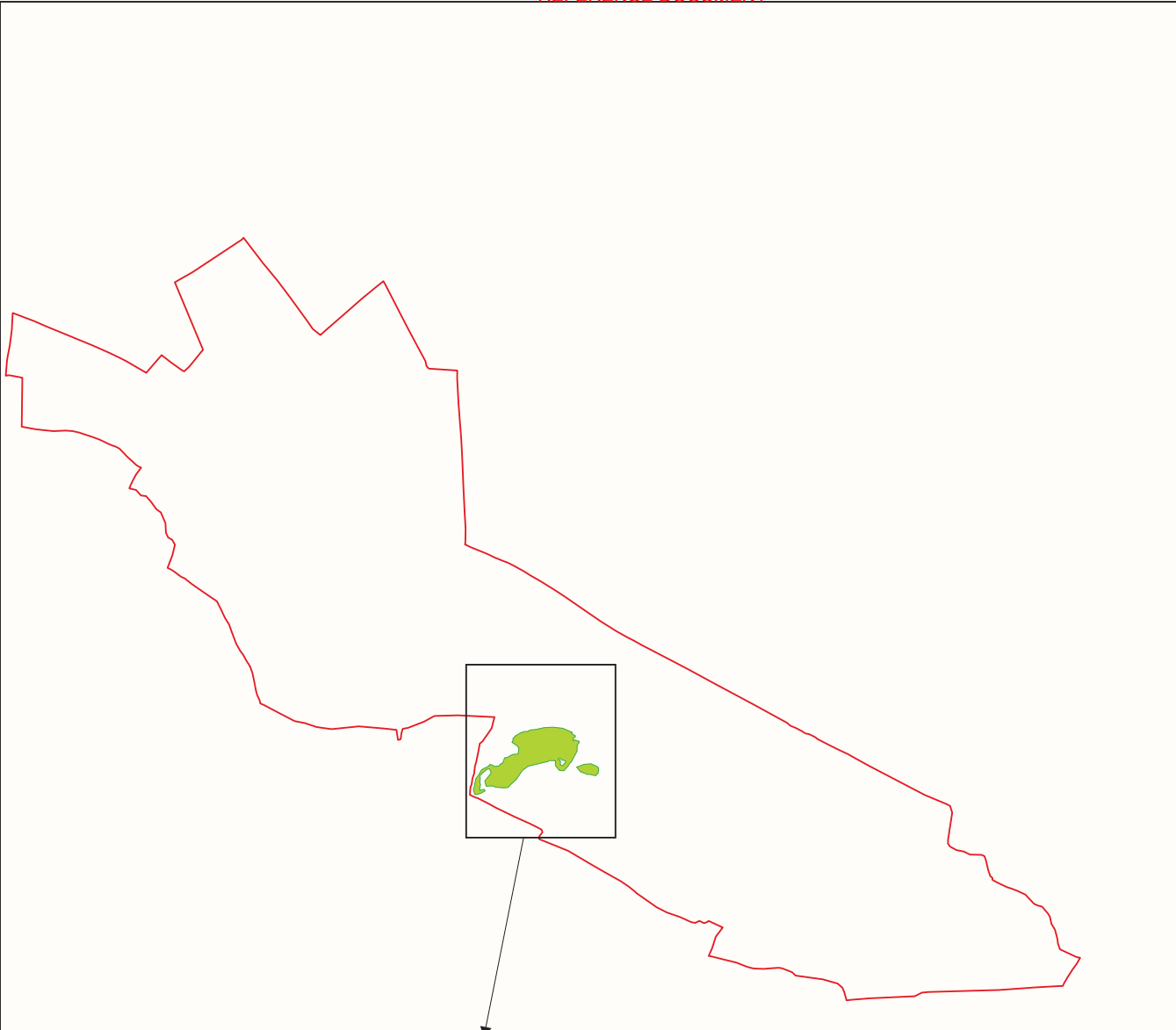


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Níl sna teorainneacha ar na léarscálteanna ach níos gairbhíochach ginearálta. Fáidtar athbhreithniú a dhéanamh ar theorainneacha na gceantar comhthráithe. Surbhíearachta Oribonáil na hÉireann Céadúnas Úrnlí EN 0069216. © Surbhíearachta Oribonáil na hÉireann Rialtas na hÉireann



Map Version 1  
Date: June 2018



**Legend**

- Tory Hill SAC 000439
- OSI Discovery Series County Boundary

**Annex I Qualifying Interests**

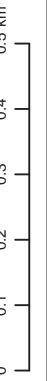
- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)



**MAP 2:  
TORY HILL - SAC  
CONSERVATION OBJECTIVES  
GRASSLAND HABITATS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 000439; version 3.01. CO. LIMERICK**

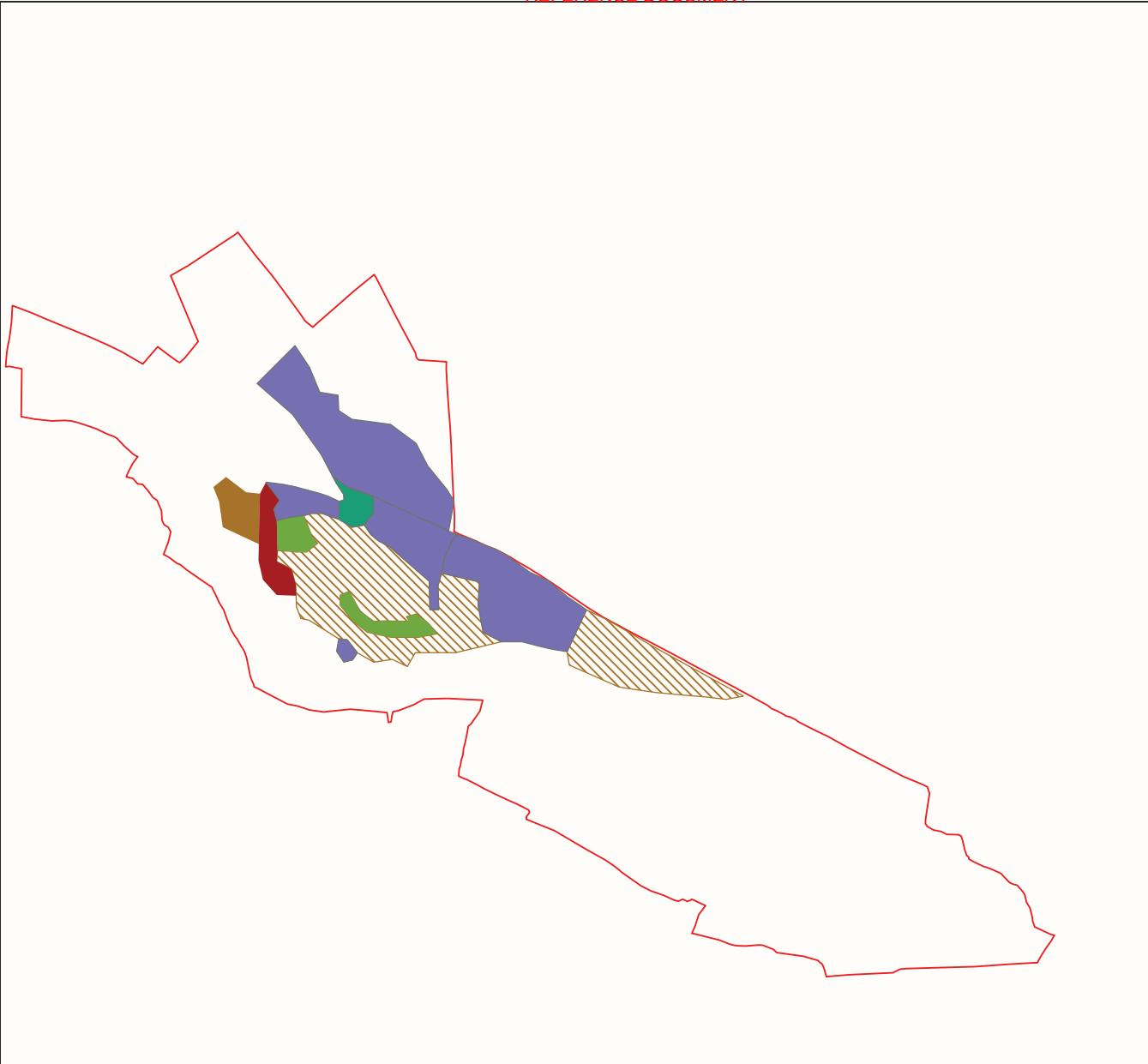


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Date: June 2018**



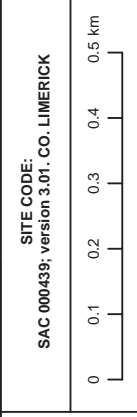
**Legend**

- OSi Discovery Series County Boundary
- Tory Hill SAC 000439
- Annex I Qualifying Interests**
- 7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*
- 7230 Alkaline fens
- 7230/GM1 Alkaline fens / Marsh mosaic
- Associated wetland habitats (Fossitt 2000)**
- FS1 Reed and large sedge swamps
- GM1 Marsh
- Annex I Non - Qualifying Interests**
- 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alhion Incanae*, *Salicion albae*)

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**MAP 3:**  
**TORY HILL - SAC**  
**CONSERVATION OBJECTIVES**  
**INDICATIVE FEN HABITATS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.



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Níl sna teorainneacha ar na léarscálteanna ach níos gairbhíochach ginearálta. Fáidtar athbheithníthe a dhéanamh ar theorainneacha na gceantar comhairle. Suirbhíreachta Oibríochtála na hÉireann Ceadúnas Uimh EN 0069216. © Suirbhíreachta Oibríochtála na hÉireann Rialtas na hÉireann

**Map Version 1**  
**Date: June 2018**

# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Ratty River Cave SAC 002316



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Department of Culture,  
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ISSN 2009-4086**



## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

*\* indicates a priority habitat under the Habitats Directive*

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002316	Ratty River Cave SAC
1303	Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i>
8310	Caves not open to the public

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	2006
<b>Title :</b>	Bat mitigation guidelines for Ireland
<b>Author :</b>	Kelleher, C.; Marnell, F.
<b>Series :</b>	Irish Wildlife Manual No. 25
<b>Year :</b>	2018
<b>Title :</b>	Conservation objectives supporting document – lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> )
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	2007
<b>Title :</b>	Protecting and managing underground sites for bats
<b>Author :</b>	Mitchell-Jones, A.J.; Bihari, Z.; Masing, M.; Rodrigues, L.
<b>Series :</b>	EUROBATS Publication Series No. 2
<b>Year :</b>	2008
<b>Title :</b>	The lesser horseshoe bat conservation handbook
<b>Author :</b>	Schofield, H.W.
<b>Series :</b>	The Vincent Wildlife Trust
<b>Year :</b>	2009
<b>Title :</b>	Importance of night roosts for bat conservation: roosting behaviour of the lesser horseshoe bat <i>Rhinolophus hipposideros</i>
<b>Author :</b>	Knight, T.; Jones, G.
<b>Series :</b>	Endangered Species Research, 8: 79-86

## Spatial data sources

<b>Year :</b>	2018
<b>Title :</b>	NPWS lesser horseshoe bat database
<b>GIS Generation :</b>	Roosts identified, clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Source :</b>	8310, 1303 (map 2)
<hr/>	
<b>Year :</b>	2007
<b>Title :</b>	Forest Inventory and Planning System (FIPS)
<b>GIS Generation :</b>	Dataset clipped to 2.5km buffer centred on roost locations
<b>Source :</b>	1303 (map 2)
<hr/>	

**Conservation Objectives for : Ratty River Cave SAC [002316]**

**8310 Caves not open to the public**

**Caves not open to the public (8310) is integrally linked to lesser horseshoe bat (*Rhinolophus hipposideros*) (1303) as part of the habitat for the species; therefore, a separate conservation objective has not been set for the habitat in Ratty River Cave SAC. See map 2. See the conservation objectives supporting document for lesser horseshoe bat (NPWS, 2018) for further details**

Attribute	Measure	Target	Notes

**Conservation Objectives for : Ratty River Cave SAC [002316]****1303 Lesser Horseshoe Bat *Rhinolophus hipposideros***

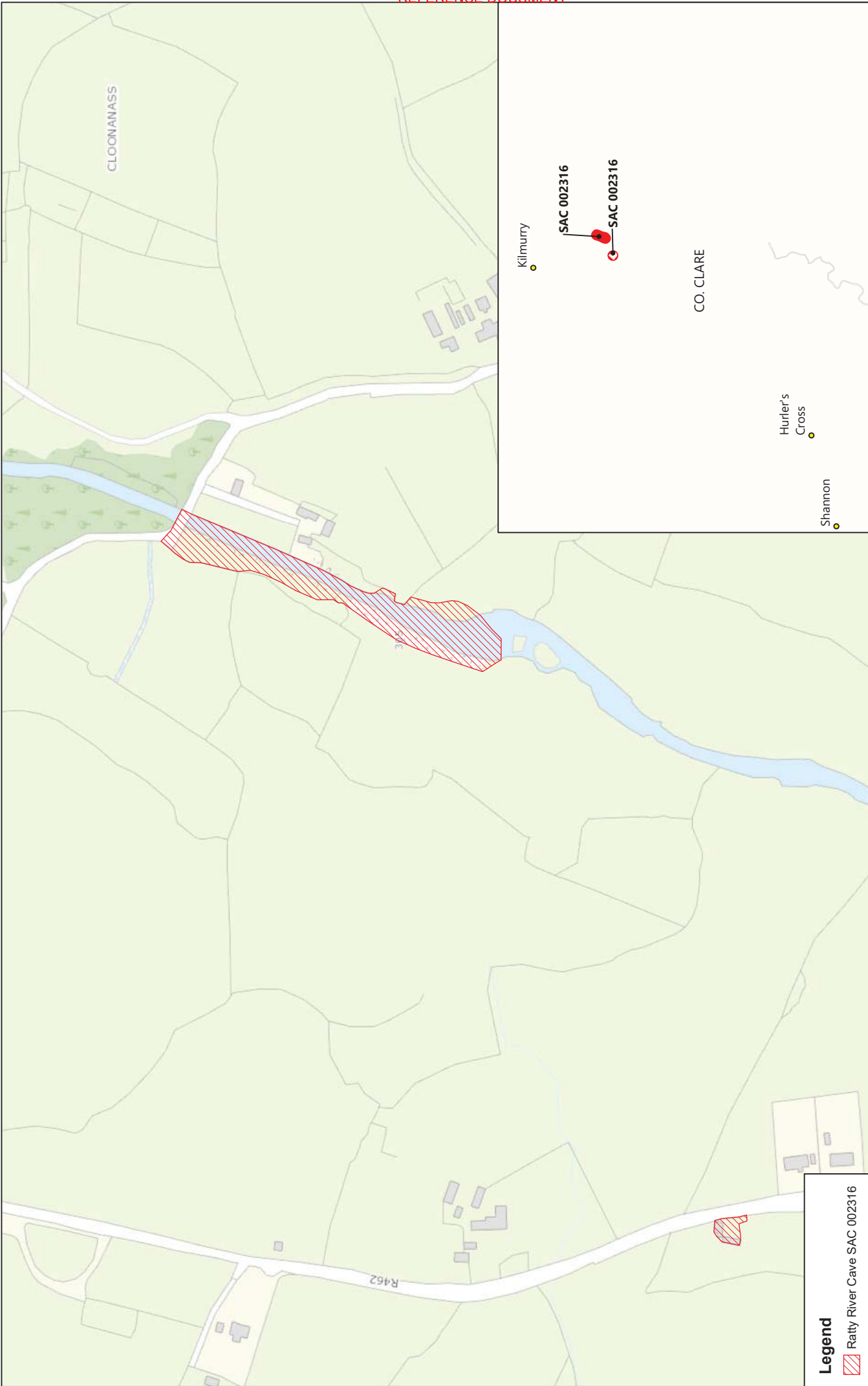
**To restore the favourable conservation condition of Lesser Horseshoe Bat in Ratty River Cave SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Population per roost	Number	Minimum number of 165 bats for the winter roost (roost id. 51 in NPWS database); minimum number of 100 bats for the summer roost (roost id. 05). See map 2	A figure of 100 bats for summer roosts and 50 bats for winter roosts was set as a minimum qualifying standard (MQS) when SACs were being selected for lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> ). NPWS conduct annual counts at each qualifying roost. Qualified means from the 2013-2017 data have been calculated whereby the year with the highest maximum count and the year with the lowest maximum count were removed and the mean of the remaining years was calculated. This mean is usually set as the target figure for each roost and this is the case for the winter roost (roost id. 51 in NPWS database) in Ratty River Cave SAC. However, in the case of the summer roost (roost id. 05) in the SAC, where a mean of 97 bats was recorded (2013-2017), the target is instead set at the MQS of 100 bats. See the conservation objectives supporting document for lesser horseshoe bat (NPWS, 2018) for further information on all attributes and targets
Winter roosts	Condition	No decline	Ratty River Cave SAC has been selected for lesser horseshoe bat because of the presence of one internationally important winter roost (roost id. 51 in NPWS database). Damage or disturbance to the roost or to the habitat immediately surrounding it will lead to a decline in its condition (Mitchell-Jones et al., 2007)
Summer roosts	Condition	No decline	Ratty River Cave SAC has been selected for lesser horseshoe bat because of the presence of one internationally important summer roost (roost id. 05 in NPWS database). Damage or disturbance to the roost or to the habitat immediately surrounding it will lead to a decline in its condition (Kelleher and Marnell, 2006)
Auxiliary roosts	Number and condition	No decline	Lesser horseshoe bat populations will use a variety of roosts during the year besides the main summer maternity and winter hibernation roosts. Such additional roosts within the SAC may be important as night roosts, satellite roosts, etc. Night roosts are also considered an integral part of core foraging areas and require protection (Knight and Jones, 2009). In addition, in response to weather conditions for example, bats may use different seasonal roosts from year to year; this is particularly noticeable in winter. A database of all known lesser horseshoe bat roosts is available on the National Biodiversity Data Centre website. NB further unrecorded roosts may also be present within this SAC
Extent of potential foraging habitat	Hectares	No significant decline within 2.5km of qualifying roosts	Lesser horseshoe bats normally forage in woodlands/scrub within 2.5km of their roosts (Schofield, 2008). See map 2 which shows a 2.5km zone around the above roosts and identifies potential foraging grounds
Linear features	Kilometres	No significant loss within 2.5km of qualifying roosts. See map 2	This species follows commuting routes from its roost to its foraging grounds. Lesser horseshoe bats will not cross open ground. Consequently, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species within 2.5km around each roost (Schofield, 2008)

REFERENCE DOCUMENT

Light pollution	Lux	No significant increase in artificial light intensity adjacent to named roosts or along commuting routes within 2.5km of those roosts. See map 2	Lesser horseshoe bats are very sensitive to light pollution and will avoid brightly lit areas. Inappropriate lighting around roosts may cause abandonment; lighting along commuting routes may cause preferred foraging areas to be abandoned, thus increasing energetic costs for bats (Schofield, 2008)
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**Legend**

 Ratty River Cave SAC 002316

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**MAP 1:  
RATTY RIVER CAVE SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 002316; version 3. CO. CLARE**



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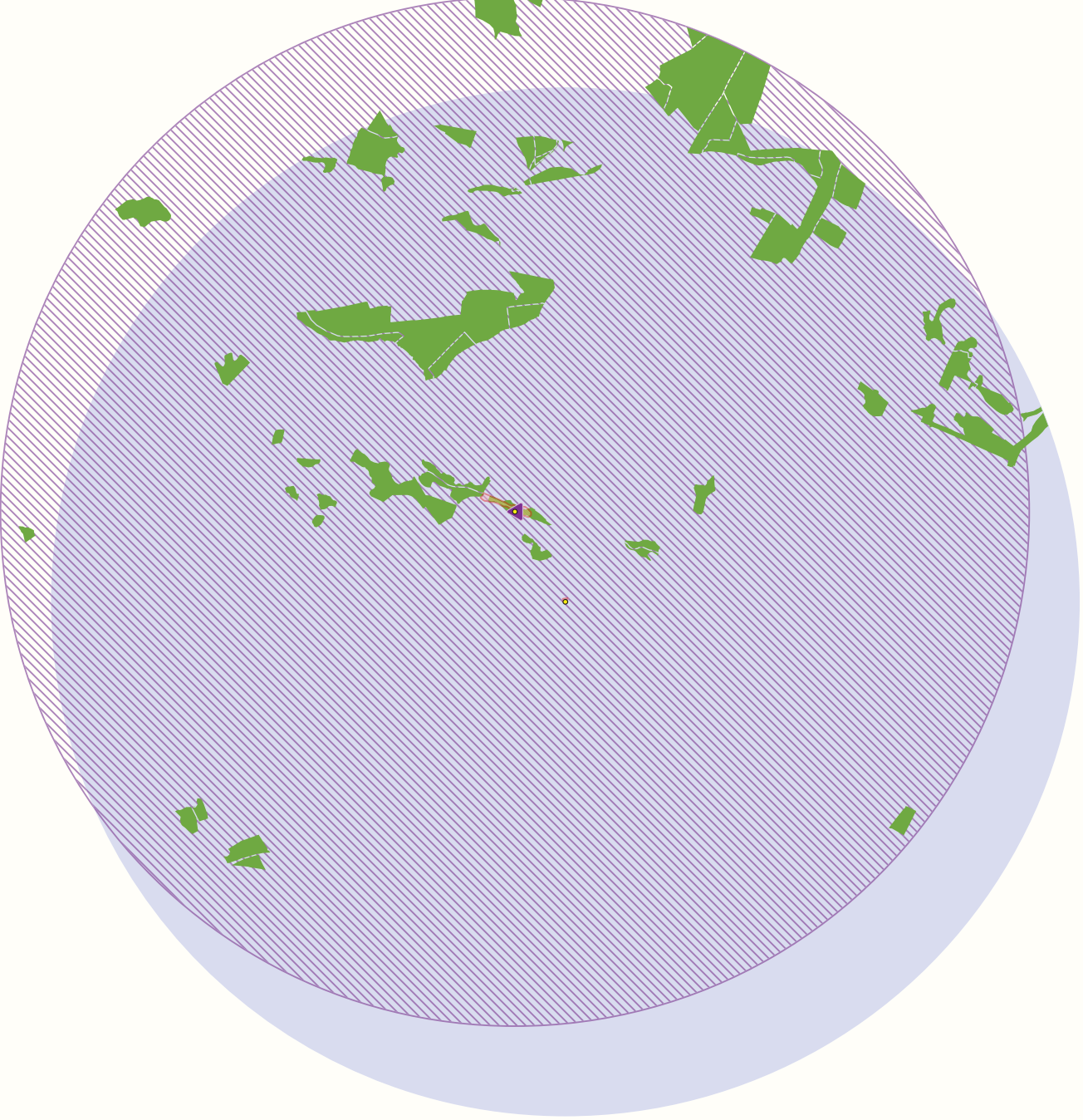
Map Version 1  
Date: June 2018





Map Version 1  
Date: June 2018

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 Níl sna teorainneacha ar na léarscáil sin ach rood gnáshuíomhach ginearálta. Fásfaidís sibhí bheith in áiteanna a d'fheallfaidís a bheith áfach ar theorainneacha na gceantar comharthaí. Surbhairacht Órdonála na hÉireann Ceadóras Úrnlí EN 0059216. © Surbhairacht Órdonála na hÉireann Rialtas na hÉireann



SITE CODE:  
SAC 002316; version 3.0. CO. CLARE



- Legend**
- OSI Discovery Series County Boundary
  - Ratty River Cave SAC 002316
  - 8310 Caves not open to the public
  - 1303 Lesser Horseshoe Bat *Rhinolophus hipposideros*
  - Roost Location
  - Roost ID 5 Foraging Range
  - Roost ID 51 Foraging Range
  - Potential Foraging Grounds

MAP 2:  
RATTY RIVER CAVE SAC  
CONSERVATION OBJECTIVES  
LESSER HORSESHOE BAT  
Map to be read in conjunction with the NPWS Conservation Objectives Document.



# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Askeaton Fen Complex SAC 002279



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Department of  
Culture, Heritage and the Gaeltacht



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**Citation:**

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and the Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## Introduction

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- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

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3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

*\* indicates a priority habitat under the Habitats Directive*

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002279      Askeaton Fen Complex SAC

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7210      Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*\*

7230      Alkaline fens

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	2009
<b>Title :</b>	Irish Red List No. 1 - Water beetles
<b>Author :</b>	Foster, G.N.; Nelson, B.H.; O Connor, Á.
<b>Series :</b>	Ireland Red List No. 1
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2013
<b>Title :</b>	Conservation status assessments for three fen habitat types - 7230, 7210 and 7140
<b>Author :</b>	Kimberley, S.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS

### Other References

<b>Year :</b>	2004
<b>Title :</b>	Common Standards Monitoring guidance for lowland wetland habitats
<b>Author :</b>	JNCC
<b>Series :</b>	Joint Nature Conservation Committee, Peterborough
<b>Year :</b>	2011
<b>Title :</b>	Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop, Noordwijkerhout, 23-25 June 2010
<b>Author :</b>	Bobbink, R.; Hettelingh, J.P.
<b>Series :</b>	RIVM report 680359002, Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM)

## Conservation Objectives for : Askeaton Fen Complex SAC [002279]

### **7210 Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae\***

**To maintain the favourable conservation condition of Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae\* in Askeaton Fen Complex SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae* has not been mapped in detail for Askeaton Fen SAC and thus the total area of the qualifying priority habitat in the SAC is unknown. <i>Cladium</i> fen occurs in various forms and is the most common fen type in the SAC; relatively extensive areas of the habitat occur throughout all the sections of the SAC. The habitat is associated with wet conditions and can be found growing on a marl base, such as at Feereagh and Mornane Loughs and in the fen in the townland of Mornane. In slightly drier conditions, it can be found in association with common reed ( <i>Phragmites australis</i> ), such as at Deegerty, Blind Lough and Dromlohan. The habitat also occurs in mosaic with small areas of alkaline fen (7230) vegetation on peaty substrate. At some edges of the habitat, a gradation to wet marsh can occur, which in turn grades into wet grassland (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions	Drainage, either within or surrounding the fen habitat, can result in the drawdown of the fen groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats. Drainage has occurred in the past in some parts of Askeaton Fen Complex SAC and poses a threat to the habitat in the SAC (NPWS internal files)
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should also be relatively calcium-rich

Vegetation composition: typical species	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical species, including brown mosses and vascular plants	For lists of typical plant species, see the Article 17 conservation status assessment for <i>Cladium</i> fens (NPWS, 2013) and the Article 17 fen habitats supporting document (Kimberley, 2013). In this SAC, species occurring with great fen-sedge ( <i>Cladium mariscus</i> ) in the habitat include common reed ( <i>Phragmites australis</i> ), pondweeds ( <i>Potamogeton</i> spp.), marsh horsetail ( <i>Equisetum palustre</i> ), water horsetail ( <i>E. fluviatile</i> ), lesser water-parsnip ( <i>Berula erecta</i> ), lesser marshwort ( <i>Apium inundatum</i> ), water mint ( <i>Mentha aquatica</i> ) and, particularly where marl is present, bottle sedge ( <i>Carex rostrata</i> ) (NPWS internal files)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable impacts such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. See JNCC (2004) and Kimberley (2013)
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014). Scrub and trees will tend to invade if fen conditions become drier
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground not more than 10%. Where tufa is present, disturbed bare ground not more than 1%	Attribute and target based on Perrin et al. (2014). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The habitat in the SAC contains the only known population of the Critically Endangered water beetle <i>Hygrotus decoratus</i> and also the Near Threatened <i>Hydroporus scalesianus</i> (Foster et al., 2009), a water beetle indicative of undisturbed fens (NPWS internal files)



**Conservation Objectives for : Askeaton Fen Complex SAC [002279]**

**7230 Alkaline fens**

**To maintain the favourable conservation condition of Alkaline fens in Askeaton Fen Complex SAC, which is defined by the following list of attributes and targets:**

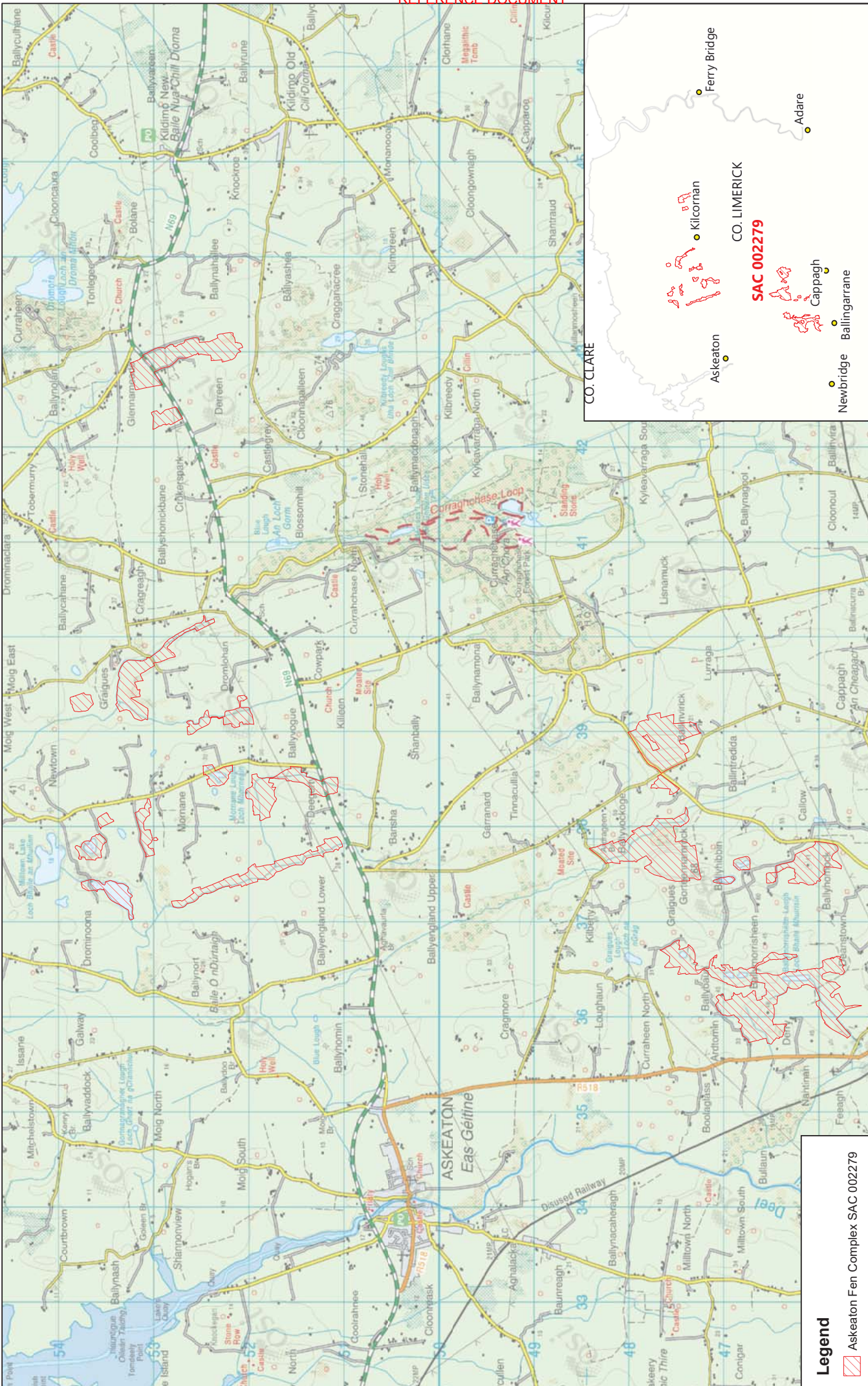
<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alkaline fen has not been mapped in detail for Askeaton Fen Complex SAC and thus the total area of the qualifying habitat in the SAC is unknown. The habitat is generally confined to the margins and seepage zones of fen areas and exhibits a wide range of variation in terms of species composition, species dominance and structure depending on hydrology, substrate and degree of interference. The habitat is particularly well-represented at Graigues, Moig West and north-west of Ballyvogue. Small areas of the habitat are found throughout all the sections of the SAC, but it is not as extensive as <i>Cladium</i> fen habitat (7210) with which it occurs in association in places. The habitat also grades into marsh and wet grassland in some areas (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013). See also Bobbink and Hettelingh (2011)
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions	Drainage, either within or surrounding the fen habitat, can result in the drawdown of the alkaline fen groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats. Drainage has occurred in the past in some parts of Askeaton Fen Complex SAC and poses a threat to the habitat in the SAC (NPWS internal files)
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should also be relatively calcium-rich
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of alkaline fen vegetation communities within this SAC is unknown. Information on the vegetation communities associated with alkaline fens in the uplands is presented in Perrin et al. (2014)

Vegetation composition: brown mosses	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical brown moss species	Typical brown moss species include <i>Bryum pseudotriquetrum</i> , <i>Calliergonella cuspidata</i> , <i>Calliergon giganteum</i> , <i>Campyllum stellatum</i> , <i>Cratoneuron filicinum</i> , <i>Ctenidium molluscum</i> , <i>Fissidens adianthoides</i> , <i>Palustriella commutata</i> , <i>Scorpidium cossonii</i> , <i>S. revolvens</i> and <i>S. scopioides</i> . In this SAC, there is an abundance of brown mosses in the habitat, including <i>Campyllum stellatum</i> , <i>Calliergonella cuspidata</i> , <i>Ctenidium molluscum</i> , <i>Fissidens adianthoides</i> and <i>Bryum pseudotriquetrum</i> (NPWS internal files)
Vegetation composition: typical vascular plants	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical vascular plant species	For lists of typical plant species, see the Article 17 conservation status assessment for alkaline fens (NPWS, 2013) and the fen habitats supporting document (Kimberley, 2013). See also Perrin et al. (2014) and JNCC (2004). Species occurring with black bog-rush ( <i>Schoenus nigricans</i> ) in the habitat in the SAC include purple moor-grass ( <i>Molinia caerulea</i> ), long-stalked yellow-sedge ( <i>Carex lepidocarpa</i> ), carnation sedge ( <i>C. panicea</i> ) and other sedges, and rushes ( <i>Juncus</i> spp.) (NPWS internal files)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable impacts such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. Native negative indicators may include graminoids such as reed canary-grass ( <i>Phalaris arundinacea</i> ) and reed sweet-grass ( <i>Glyceria maxima</i> ), tall herbs such as great willowherb ( <i>Epilobium hirsutum</i> ), bracken ( <i>Pteridium aquilinum</i> ), bramble ( <i>Rubus fruticosus</i> ) and common nettle ( <i>Urtica dioica</i> ), and bryophytes such as <i>Brachythecium rutabulum</i> and <i>Kindbergia praelonga</i>
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014). Scrub and trees will tend to invade if fen conditions become drier
Vegetation composition: soft rush and common reed cover	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of soft rush ( <i>Juncus effusus</i> ) and common reed ( <i>Phragmites australis</i> ) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: litter	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of litter not more than 25%	Attribute and target based on JNCC (2004). More than 25% litter cover may indicate insufficient removal of biomass by grazing and/or undesirable water table levels
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground not more than 10%	Attribute and target based on Perrin et al. (2014). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands
Physical structure: tufa formations	Percentage cover in local vicinity of a representative number of monitoring stops	Disturbed proportion of vegetation cover where tufa is present is less than 1%	Attribute and target based on Perrin et al. (2014)

REFERENCE DOCUMENT

Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)
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**Legend**

- Askeaton Fen Complex SAC 002279

**MAP 1:**  
ASKEATON FEN COMPLEX SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
SAC 002279; version 3. CO. LIMERICK

2 Kilometers

An Roinn  
Cultúr, Oidhreacht agus Gaeltachta  
Department of  
Culture, Heritage and the Gaeltacht

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáilleana ach níl gearrthuomhach, ginearálta. Fásadair athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaíche. Suidhreachta Oidreachta na hÉireann. Ceadaíonn Úrnlí EN 0069216. © Suidhreachta Oidreachta na hÉireann. Rialtas na hÉireann

**Map Version 1**  
Date: Aug 2017



## Conservation objectives for Barrigone SAC [000432]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

### Code Description

5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)
8240	Limestone pavements*

\* denotes a priority habitat

Code	Common Name	Scientific Name
1065	Marsh Fritillary	<i>Euphydryas aurinia</i>



**Citation:** NPWS (2018) Conservation objectives for Barrigone SAC [000432]. Generic Version 6.0.  
Department of Culture, Heritage and the Gaeltacht.

# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Curraghchase Woods SAC 000174



An Roinn Cultúir,  
Oidhreacht agus Gaeltachta  
Department of Culture,  
Heritage and the Gaeltacht

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Department of Culture, Heritage and the Gaeltacht,  
90 King Street North, Dublin 7, D07 N7CV, Ireland.**

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E-mail: [nature.conservation@chg.gov.ie](mailto:nature.conservation@chg.gov.ie)**

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Version 1. National Parks and Wildlife Service, Department of Culture, Heritage  
and the Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**



## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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000174      Curraghchase Woods SAC

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1303      Lesser Horseshoe Bat *Rhinolophus hipposideros*

91E0      Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)\*

91J0      *Taxus baccata* woods of the British Isles\*

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	2006
<b>Title :</b>	Bat mitigation guidelines for Ireland
<b>Author :</b>	Kelleher, C.; Marnell, F.
<b>Series :</b>	Irish Wildlife Manual No. 25
<b>Year :</b>	2008
<b>Title :</b>	National survey of native woodlands 2003-2008
<b>Author :</b>	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2010
<b>Title :</b>	A provisional inventory of ancient and long-established woodland in Ireland
<b>Author :</b>	Perrin, P.M.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manual No. 46
<b>Year :</b>	2013
<b>Title :</b>	Results of a monitoring survey of yew woodland
<b>Author :</b>	Cross, J.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No. 72
<b>Year :</b>	2018
<b>Title :</b>	Conservation objectives supporting document – lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> )
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	2000
<b>Title :</b>	A guide to habitats in Ireland
<b>Author :</b>	Fossitt, J.A.
<b>Series :</b>	The Heritage Council, Kilkenny
<b>Year :</b>	2002
<b>Title :</b>	Reversing the habitat fragmentation of British woodlands
<b>Author :</b>	Peterken, G.
<b>Series :</b>	WWF-UK, London
<b>Year :</b>	2007
<b>Title :</b>	Protecting and managing underground sites for bats
<b>Author :</b>	Mitchell-Jones, A.J.; Bihari, Z.; Masing, M.; Rodrigues, L.
<b>Series :</b>	EUROBATS Publication Series No. 2
<b>Year :</b>	2008
<b>Title :</b>	The lesser horseshoe bat conservation handbook
<b>Author :</b>	Schofield, H.W.
<b>Series :</b>	The Vincent Wildlife Trust

**Year :** 2009  
**Title :** Importance of night roosts for bat conservation: roosting behaviour of the lesser horseshoe bat  
*Rhinolophus hipposideros*  
**Author :** Knight, T.; Jones, G.  
**Series :** Endangered Species Research, 8: 79-86

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## Spatial data sources

<b>Year :</b>	Revision 2010
<b>Title :</b>	National Survey of Native Woodlands 2003-2008. Version 1
<b>GIS Generation :</b>	QI selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Source :</b>	91E0 (map 2)
<b>Year :</b>	2013
<b>Title :</b>	Internal NPWS data
<b>GIS Generation :</b>	Habitat polygon created from spatial references supplied by NPWS expert. Expert opinion used as necessary to resolve any issues arising
<b>Source :</b>	91J0 (map 2)
<b>Year :</b>	2018
<b>Title :</b>	NPWS lesser horseshoe bat database
<b>GIS Generation :</b>	Roosts identified, clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Source :</b>	1303 (map 3)
<b>Year :</b>	2007
<b>Title :</b>	Forest Inventory and Planning System (FIPS)
<b>GIS Generation :</b>	Dataset clipped to 2.5km buffer centred on roost locations
<b>Source :</b>	1303 (map 3)

## Conservation Objectives for : Curraghchase Woods SAC [000174]

### 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)\* in Curraghchase Woods SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* was surveyed in Curraghchase Woods SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) within the sub-site Curraghchase Forest Park (NSNW site code 1986), where the wet woodland occurs on peat merging into open alkaline fen near Blue Lough. Map 2 shows the surveyed woodland areas classified as 91E0* (3.46ha) and as Fossitt (2000) woodland types by Perrin et al. (2008). It is important to note that other areas mapped as wet woodland types (WN4 and WN6; Fossitt, 2000) may also correspond with this Annex I woodland habitat. Further unsurveyed areas may also be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 2 for surveyed woodland locations	Distribution based on Perrin et al. (2008). See the notes for Habitat area above
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder ( <i>Alnus glutinosa</i> ) and oak ( <i>Quercus</i> spp.) tend to regenerate poorly. Ash ( <i>Fraxinus excelsior</i> ) often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river flood plains, but not for woodland around springs/seepage areas
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder ( <i>Alnus glutinosa</i> ))	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red data and other rare or localised species
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder ( <i>Alnus glutinosa</i> ), willows ( <i>Salix</i> spp.), oak ( <i>Quercus</i> spp.), ash ( <i>Fraxinus excelsior</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: beech ( <i>Fagus sylvatica</i> ), sycamore ( <i>Acer pseudoplatanus</i> ) and rhododendron ( <i>Rhododendron ponticum</i> )

**Conservation Objectives for : Curraghchase Woods SAC [000174]**

**91J0 Taxus baccata woods of the British Isles**

**To restore the favourable conservation condition of *Taxus baccata* woods of the British Isles\* in Curraghchase Woods SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes. See map 2	<i>Taxus baccata</i> woods of the British Isles* within Curraghchase Woods SAC was included in a national monitoring survey of yew ( <i>Taxus baccata</i> ) woodlands by Cross and Lynn (2013) in the sub-site Curraghchase. The minimum area of yew woodland in the SAC estimated by Cross and Lynn (2013) is 3.26ha (see map 2). Yew woodland in the SAC had previously been surveyed by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) within the sub-site Curraghchase Forest Park (NSNW site code 1986). Map 2 shows the surveyed woodlands in the SAC, including the area classified as 91J0* (3.26ha) by Cross and Lynn (2013). NB further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 2	Distribution based on Cross and Lynn (2013) and NPWS internal files. The area of yew ( <i>Taxus baccata</i> ) woodland in the Curraghchase sub-site occupies the top and sides of a hard limestone ridge/rocky knoll above a stream valley (Cross and Lynn, 2013; NPWS internal files). NB further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing	See Perrin et al. (2008), Cross and Lynn (2013) and NPWS internal files for further details
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and herb and bryophyte layer	Described in Perrin et al. (2008), Cross and Lynn (2013) and NPWS internal files. In the habitat in the Curraghchase sub-site, the field layer is poorly developed under deep shade and consists largely of ivy ( <i>Hedera helix</i> ) with a scattering of other species (Perrin et al., 2008; Cross and Lynn, 2013)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008), Cross and Lynn (2013) and NPWS internal files
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yew ( <i>Taxus baccata</i> ) regenerates poorly under its own canopy, but can regenerate under a canopy of other species or in the open if the competition from the field layer is not too strong. In the habitat in this SAC, there is considerable natural regeneration of yew in light gaps (Cross and Lynn, 2013). Planting of yew has also taken place at Curraghchase as part of the EU LIFE project 'Restoring Priority Woodland Habitats in Ireland' managed by Coillte (Cross and Lynn, 2013)
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red data and other rare or localised species



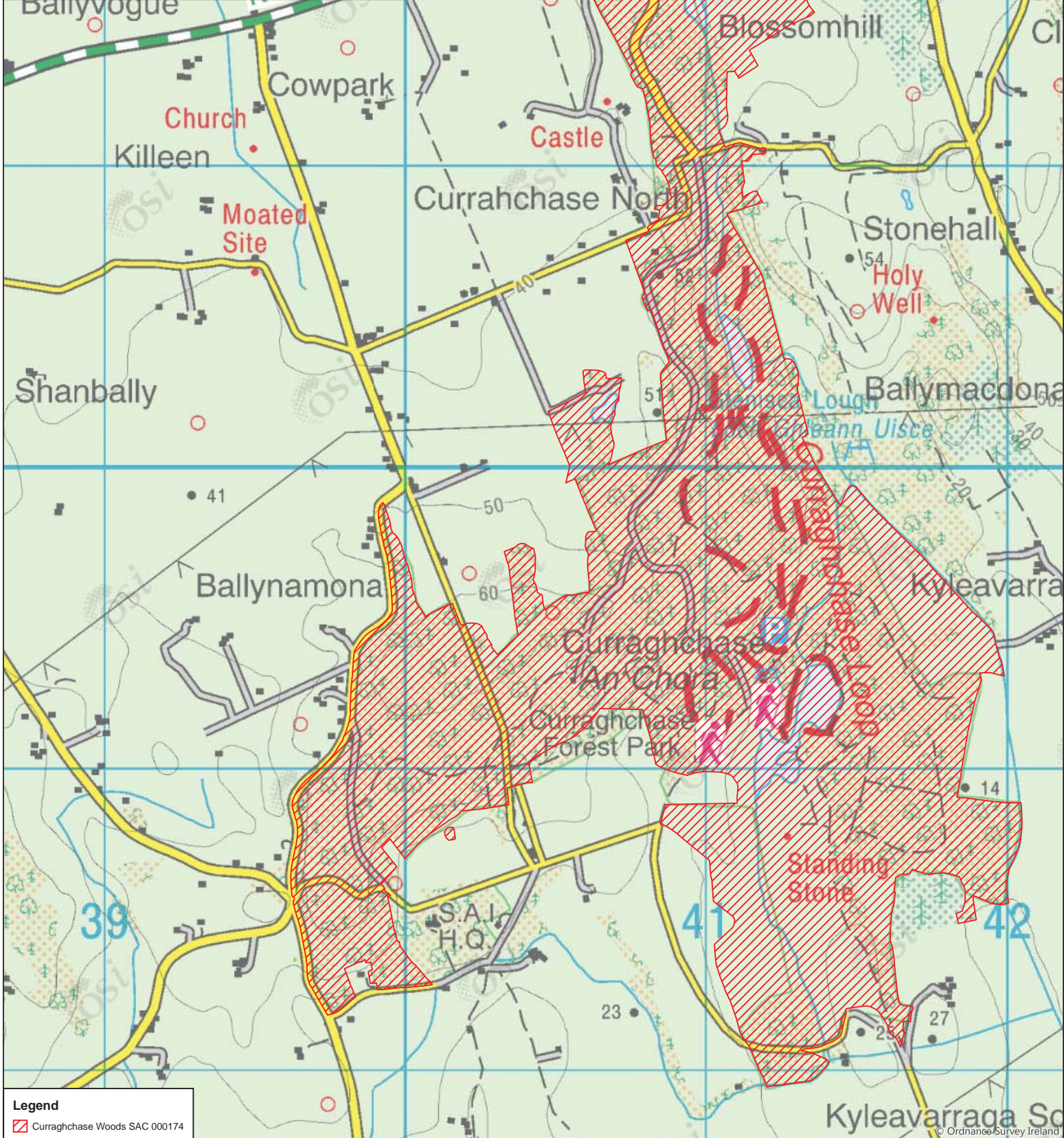
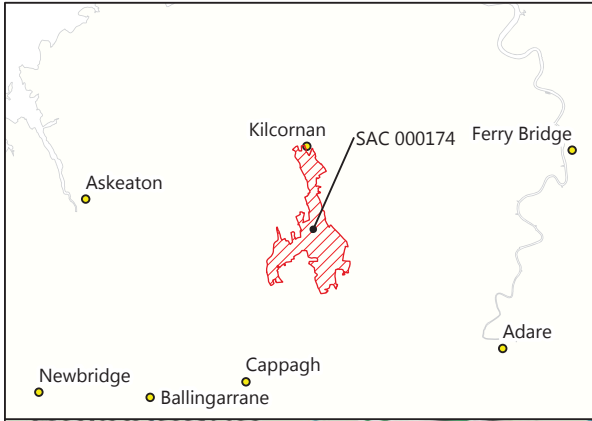
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008), Cross and Lynn (2013) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, including yew ( <i>Taxus baccata</i> ) and ash ( <i>Fraxinus excelsior</i> )	Species reported in Perrin et al. (2008), Cross and Lynn (2013) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The most common invasive species in this woodland type is beech ( <i>Fagus sylvatica</i> ), although there is evidence to suggest that it actually facilitates regeneration of yew ( <i>Taxus baccata</i> ). In the yew woodland in this SAC, beech trees have been thinned and cherry laurel ( <i>Prunus laurocerasus</i> ) largely removed as part of the EU LIFE project managed by Coillte (Cross and Lynn, 2013)

**Conservation Objectives for : Curraghchase Woods SAC [000174]****1303 Lesser Horseshoe Bat *Rhinolophus hipposideros***

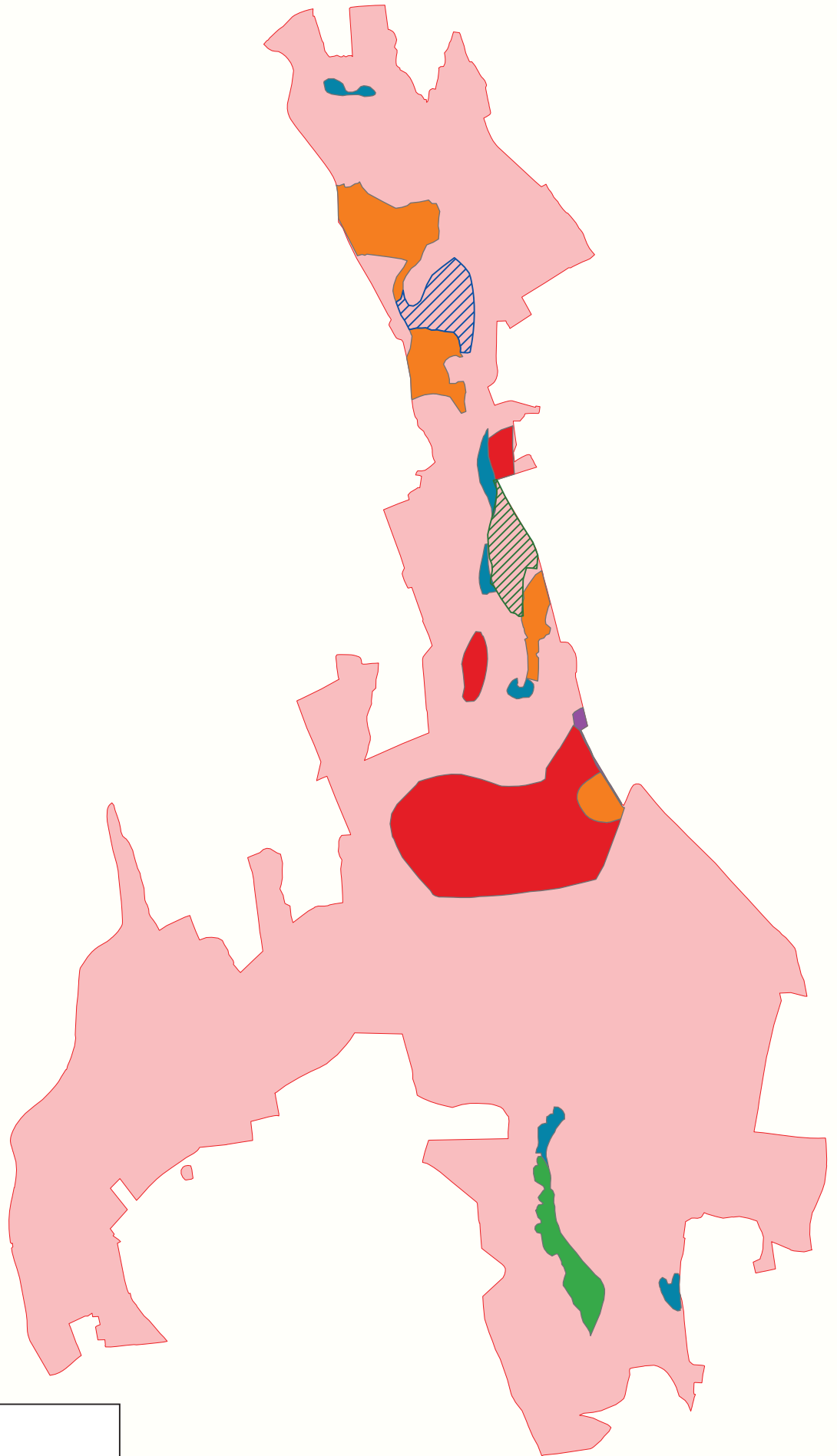
**To restore the favourable conservation condition of Lesser Horseshoe Bat in Curraghchase Woods SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Population per roost	Number	Minimum number of 100 bats for the summer roost (linked roost ids 659 and 852 in NPWS database); minimum number of 81 bats for the winter roost (roost id. 659). See map 3	A figure of 100 bats for summer roosts and 50 bats for winter roosts was set as a minimum qualifying standard (MQS) when SACs were being selected for lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> ). NPWS conduct annual counts at each qualifying roost. Qualified means from the 2012-2016 data have been calculated whereby the year with the highest maximum count and the year with the lowest maximum count were removed and the mean of the remaining years was calculated. This mean is usually set as the target figure for each roost and this is the case for the winter roost (roost id. 659 in NPWS database) in Curraghchase Woods SAC. However, in the case of the summer roost (linked roost ids. 659 and 852 in NPWS database) where a mean of 89 bats was recorded (2012-2016), the target is instead set at the MQS of 100 bats. See the conservation objectives supporting document for lesser horseshoe bat (NPWS, 2018) for further information on all attributes and targets
Winter roosts	Condition	No decline	Curraghchase Woods SAC has been selected for lesser horseshoe bat because of the presence of one internationally important winter roost (roost id. 659 in NPWS database). Damage or disturbance to this roost or to the habitat immediately surrounding it will lead to a decline in its condition (Mitchell-Jones et al., 2007)
Summer roosts	Condition	No decline	Curraghchase Woods SAC has been selected for lesser horseshoe bat because of the presence of two linked roosts (linked roost ids 659 and 852 in NPWS database) that together form one internationally important summer roost. Damage or disturbance to the linked roosts or to the habitat immediately surrounding the roosts will lead to a decline in their condition (Kelleher and Marnell, 2006)
Auxiliary roosts	Number and condition	No decline	Lesser horseshoe bat populations will use a variety of roosts during the year besides the main summer maternity and winter hibernation roosts. Such additional roosts within the SAC may be important as night roosts, satellite roosts, etc. Night roosts are also considered an integral part of core foraging areas and require protection (Knight and Jones, 2009). In addition, in response to weather conditions for example, bats may use different seasonal roosts from year to year; this is particularly noticeable in winter. One other summer roost that supports lesser horseshoe bats, but at numbers below the MQS figure, is known from Curraghchase Woods SAC. A database of all known lesser horseshoe bat roosts is available on the National Biodiversity Data Centre website. NB further unrecorded roosts may also be present within this SAC
Extent of potential foraging habitat	Hectares	No significant decline within 2.5km of qualifying roosts	Lesser horseshoe bats normally forage in woodlands/scrub within 2.5km of their roosts (Schofield, 2008). See map 3 which shows a 2.5km zone around the above roosts and identifies potential foraging grounds

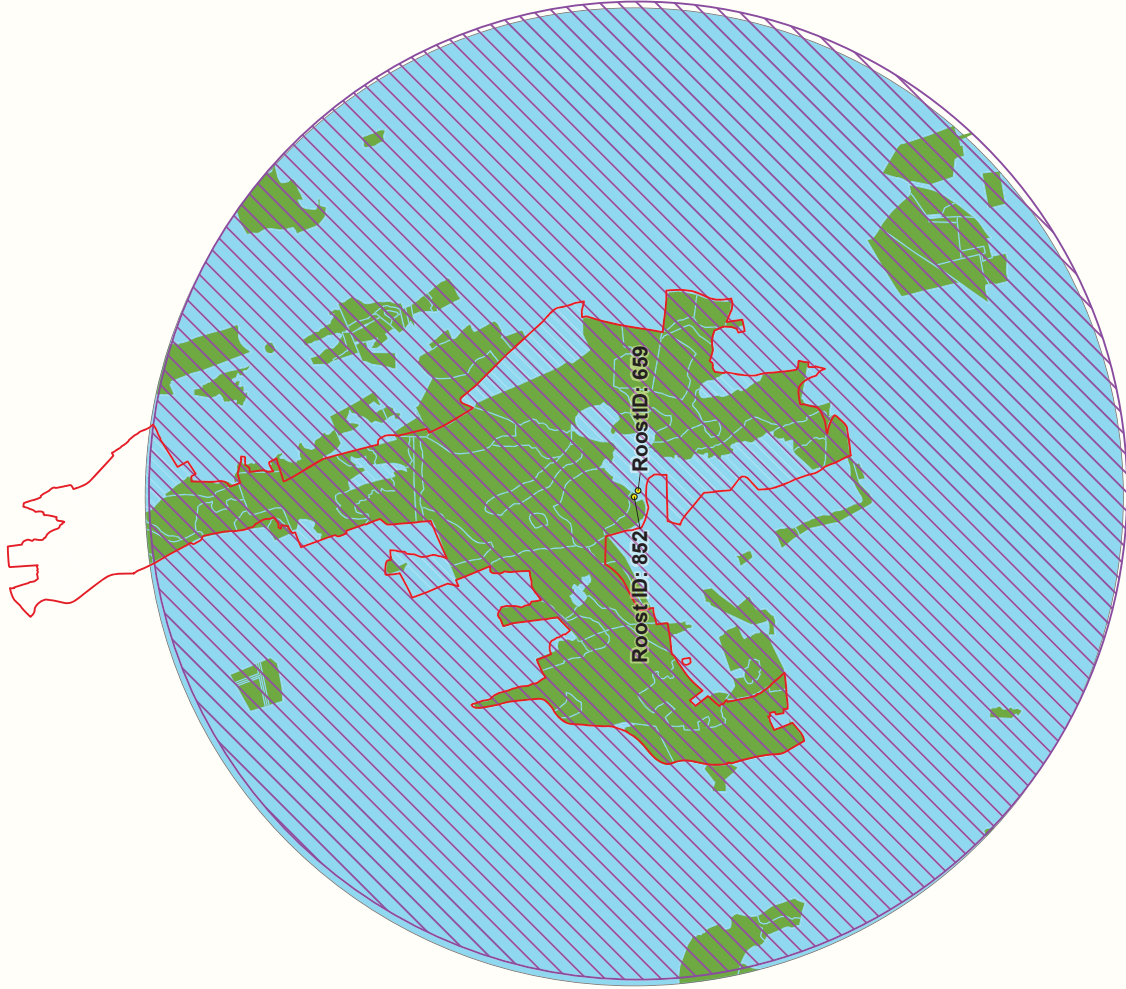
Linear features	Kilometres	No significant loss within 2.5km of qualifying roosts. See map 3	This species follows commuting routes from its roost to its foraging grounds. Lesser horseshoe bats will not cross open ground. Consequently, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species within 2.5km around each roost (Schofield, 2008)
Light pollution	Lux	No significant increase in artificial light intensity adjacent to named roosts or along commuting routes within 2.5km of those roosts. See map 3	Lesser horseshoe bats are very sensitive to light pollution and will avoid brightly lit areas. Inappropriate lighting around roosts may cause abandonment; lighting along commuting routes may cause preferred foraging areas to be abandoned, thus increasing energetic costs for bats (Schofield, 2008)



**Legend**  
 Curraghchase Woods SAC 000174



- Legend**
- Curraghchase Woods SAC 000174
  - OSI Discovery Series County Boundary
  - Annex I Woodland Habitats**
  - 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Pandion*, *Alnion incanae*, *Salicion albae*)
  - 91J0 *Taxus baccata* woods of the British Isles\*
  - Non Qualifying Interests**
  - WD1 (Mixed) broadleaved woodland
  - WN2 Oak-ash-hazel woodland
  - WN4 / WN6 Wet pedunculate oak-ash woodland / Wet willow-alder-ash woodland
  - WN6 Wet willow-alder-ash woodland
  - WN7 Bog woodland



- Legend**
- OSI Discovery Series County Boundary
  - Curragh Chase Woods SAC 000174
  - 1303 Lesser Horseshoe Bat *Rhinolophus hipposideros***
  - Roost Location
  - Roost ID 659 Foraging Range
  - Roost ID 852 Foraging Range
  - Potential Foraging Grounds



**MAP 3:**  
**CURRAGHCHASE WOODS SAC**  
**CONSERVATION OBJECTIVES**  
**LESSER HORSESHOE BAT**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
 SAC 000174; version 3.0. CO. CLARE

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
 Ordnance Survey of Ireland Licence No EN 0059216. © Ordnance Survey of Ireland Government of Ireland  
 Níl sna teorainneacha ar na léarscáil seo ach rood gnáthúil ach ní gá. Fásfaidh sibh bheith ábhaith a d'fheall ar an t-ádh na gceantar comharthaí. Sárpháirceáil Oronáil na hÉireann Ceardnais Úrth EN 0059216. © Sárpháirceáil Oronáil na hÉireann Ráil na hÉireann



## Conservation objectives for Lough Derg (Shannon) SPA [004058]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	Common Name	Scientific Name
A017	Cormorant	<i>Phalacrocorax carbo</i>
A061	Tufted Duck	<i>Aythya fuligula</i>
A067	Goldeneye	<i>Bucephala clangula</i>
A193	Common Tern	<i>Sterna hirundo</i>

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, "Wetland and Waterbirds" may be included as a Special Conservation Interest for some SPAs that have been



21/02/2018

***Generic Conservation Objectives***

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designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a second objective is included as follows:

Objective: To maintain or restore the favourable conservation condition of the wetland habitat at Lough Derg (Shannon) SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

***Citation:*** NPWS (2018) Conservation objectives for Lough Derg (Shannon) SPA [004058]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.



# National Parks and Wildlife Service

## ***Conservation Objectives Series***

### River Shannon and River Fergus Estuaries SPA 004077



***An Roinn  
Ealaíon, Oidhreachta agus Gaeltachta***  
***Department of  
Arts, Heritage and the Gaeltacht***



**National Parks and Wildlife Service,  
Department of Arts, Heritage and the Gaeltacht,  
7 Ely Place, Dublin 2, Ireland.  
Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

NPWS (2012) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0.  
National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

**Series Editors: Rebecca Jeffrey & Naomi Kingston  
ISSN 2009-4086**

## Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

### Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

### 004077 River Shannon and River Fergus Estuaries SPA

A017	Cormorant <i>Phalacrocorax carbo</i>	breeding + wintering
A038	Whooper Swan <i>Cygnus cygnus</i>	wintering
A046	Light-bellied Brent Goose <i>Branta bernicla hrota</i>	wintering
A048	Shelduck <i>Tadorna tadorna</i>	wintering
A050	Wigeon <i>Anas penelope</i>	wintering
A052	Teal <i>Anas crecca</i>	wintering
A054	Pintail <i>Anas acuta</i>	wintering
A056	Shoveler <i>Anas clypeata</i>	wintering
A062	Scaup <i>Aythya marila</i>	wintering
A137	Ringed Plover <i>Charadrius hiaticula</i>	wintering
A140	Golden Plover <i>Pluvialis apricaria</i>	wintering
A141	Grey Plover <i>Pluvialis squatarola</i>	wintering
A142	Lapwing <i>Vanellus vanellus</i>	wintering
A143	Knot <i>Calidris canutus</i>	wintering
A149	Dunlin <i>Calidris alpina</i>	wintering
A156	Black-tailed Godwit <i>Limosa limosa</i>	wintering
A157	Bar-tailed Godwit <i>Limosa lapponica</i>	wintering
A160	Curlew <i>Numenius arquata</i>	wintering
A162	Redshank <i>Tringa totanus</i>	wintering
A164	Greenshank <i>Tringa nebularia</i>	wintering
A179	Black-headed Gull <i>Chroicocephalus ridibundus</i>	wintering
A999	Wetlands	

**Please note that this SPA overlaps with Lower River Shannon SAC (002165). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.**

## Supporting documents, relevant reports & publications (listed by date)

*Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)*

**Title:** BirdLife International Seabird Ecology and Foraging Range Database

**Year:** 2012

**Author:** BirdLife International

**Series:** <http://seabird.wikispaces.com>

**Title:** Seabird Monitoring Programme (SMP) Database

**Year:** 2012

**Author:** JNCC

**Series:** <http://jncc.defra.gov.uk/smp/Default.aspx>

**Title:** River Shannon and River Fergus Estuaries SPA (004077). Conservation objectives supporting document. [Version 1]

**Year:** 2012

**Author:** NPWS

**Series:** Unpublished Report to NPWS

**Title:** Seabird Populations of Britain and Ireland

**Year:** 2004

**Author:** Mitchell, P.I.; Newton, S.F.; Ratcliffe, N.; Dunn, T.E.

**Series:** Poyser, London

**Title:** Seabird monitoring handbook for Britain and Ireland: a compilation of methods for survey and monitoring of breeding seabirds.

**Year:** 1995

**Author:** Walsh, P.; Halley, D.J.; Harris, M.P.; del Nevo, A.; Sim, I.M.W.; Tasker, M.L.

**Series:** JNCC, Peterborough

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A017 Cormorant *Phalacrocorax carbo***

To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	This attribute applies to breeding cormorant. Measure based on standard survey methods (see Walsh et al., 1995). Mitchell et al. (2004) provides summary population information. The Seabird Monitoring Programme (SMP) online database (JNCC, 2012) provides population data for this species
Productivity rate	Mean number	No significant decline	This attribute applies to breeding cormorant. Measure based on standard survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) online database (JNCC, 2012) provides population data for this species
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline	This attribute applies to breeding cormorant. Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995)
Prey biomass available	Kilogrammes	No significant decline	This attribute applies to breeding cormorant. Key prey items: fish (mostly benthic), some crustaceans. Key habitats: populations use sandy areas, rocky and vegetated substrate. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2012))
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	This attribute applies to breeding cormorant. Seabird species can make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2012))
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding cormorant population	This attribute applies to breeding cormorant. Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995)
Population trend	Percentage change	Long term population trend stable or increasing	This attribute applies to non-breeding cormorant. Waterbird population trends are presented in part four of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A017 Cormorant *Phalacrocorax carbo***

To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by cormorant other than that occurring from natural patterns of variation	This attribute applies to non-breeding cormorant. As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A038 Whooper Swan *Cygnus cygnus***

To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by whooper swan other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document



**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A046 Light-bellied Brent Goose *Branta bernicla hrota***

To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by light-bellied brent goose other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A048 Shelduck *Tadorna tadorna***

To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by shelduck other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A050 Wigeon *Anas penelope***

To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by wigeon other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A052 Teal *Anas crecca***

To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by teal other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A054 Pintail *Anas acuta***

To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by pintail other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A056 Shoveler *Anas clypeata***

To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by shoveler other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A062 Scaup *Aythya marila***

To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by scaup other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A137 Ringed Plover *Charadrius hiaticula***

To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by ringed plover other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document



**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A140 Golden Plover *Pluvialis apricaria***

To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by golden plover other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A141 Grey Plover *Pluvialis squatarola***

To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by grey plover other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A142 Lapwing *Vanellus vanellus***

To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by lapwing other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A143 Knot *Calidris canutus***

To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by knot other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A149 Dunlin *Calidris alpina***

To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by dunlin other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A156 Black-tailed Godwit *Limosa limosa***

To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by black-tailed godwit other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A157 Bar-tailed Godwit *Limosa lapponica***

To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A160 Curlew *Numenius arquata***

To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by curlew other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document



**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A162 Redshank *Tringa totanus***

To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by redshank other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A164 Greenshank *Tringa nebularia***

To maintain the favourable conservation condition of Greenshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by greenshank other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]**

**A179 Black-headed Gull *Chroicocephalus ridibundus***

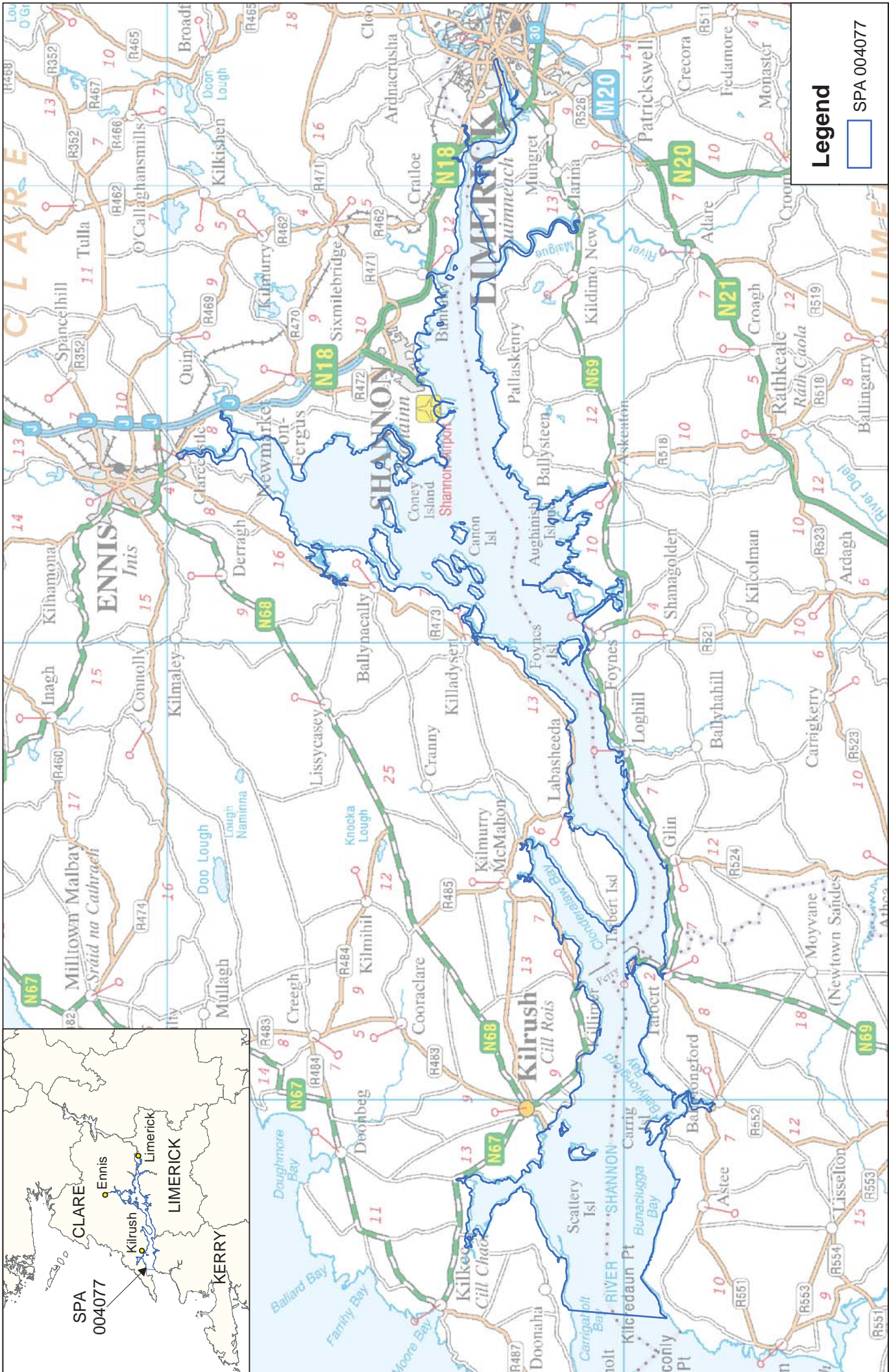
To maintain the favourable conservation condition of Black-headed Gull in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by black-headed gull other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**Conservation objectives for: River Shannon and River Fergus Estuaries SPA [004077]****A999 Wetlands**

To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:

Attribute	Measure	Target	Notes
Wetland habitat area	hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 32,261ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document



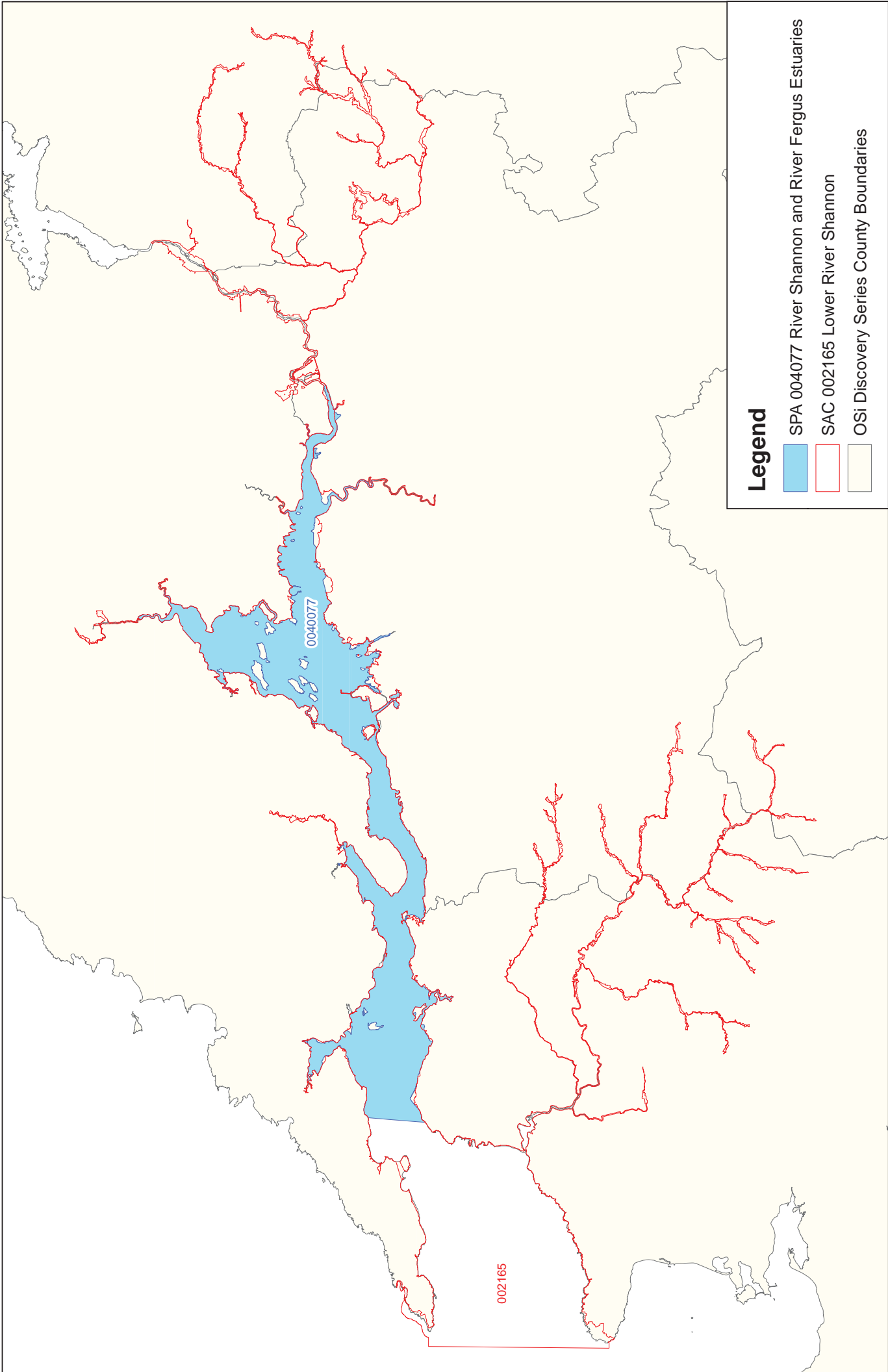
**Legend**

SPA 004077

Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).  
 Féadfar athbheithníne a déanamh ar theorainneacha na gceantar comharthaíthe. Macasamhail d'ábhar na Suirbhéarachta Ordónais le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)



MAP 1:  
 RIVER SHANNON AND RIVER FERGUS ESTUARIES  
 CONSERVATION OBJECTIVES  
 SPA DESIGNATION  
 Map to be read in conjunction with the NPWS  
 Conservation Objectives Document.

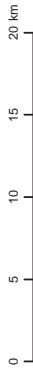


### Legend

- SPA 004077 River Shannon and River Fergus Estuaries
- SAC 002165 Lower River Shannon
- OSi Discovery Series County Boundaries

**RIVER SHANNON AND RIVER FERGUS ESTUARIES  
CONSERVATION OBJECTIVES  
ADJOINING / OVERLAPPING  
DESIGNATIONS**

Map to be read in conjunction with the NPWS  
Conservation Objectives SPA Document.



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Féadfar athbheithníthe a déanamh ar theorainneacha na gceantar comharthaíthe. Macsamhail d'ábhar na Suirbhéarachta Ordónais le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)

Site Code  
SPA 004077  
Version: CL 1.03 / LI 1.03  
/ KE 1.02  
Map Version 1  
Date: May 2012



## Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	Common Name	Scientific Name
A082	Hen Harrier	<i>Circus cyaneus</i>



**Citation:** NPWS (2018) *Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*



# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A3: Finding of No Significant Effects (FONSE) Report Screening Conclusion**



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## Finding of No Significant Effects Report

In accordance with the EC (2001) guidance document, *Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, A Finding of No Significant Effects Report has been completed for the UWF Related Works project. The standard matrix for this report provided in Annex 2 of the guidance document was followed. Line items in italics are taken directly from the guidance document.

<b>Finding of No Significance Effects Report</b>	
<i>Name and location of the Natura 2000 sites</i>	<p>The screening appraisal provided herein has examined potential effects via source pathway linkages on the designated SACs and SPAs within 15km of the UWF Related Works. This has been applied around UWF Related Works and further is extended to include a 15km area around all of the other elements of the Whole UWF Project in order to establish whether or not the UWF Related Works either alone or in-combination with the other elements of the Whole UWF Project is likely, or has potential, to have a significant effect on a European Site. There are 23 European Sites within the extended Study Area - nineteen Special Areas of Conservation (SAC) and four Special Protection Area (SPA for birds):</p> <ol style="list-style-type: none"> <li>1. Anglesey Road SAC (002125),</li> <li>2. Bolingbrook Hill SAC (002124),</li> <li>3. Keeper Hill SAC (001197),</li> <li>4. Silvermine Mountain SAC (000939),</li> <li>5. Silvermine Mountain West SAC (002258),</li> <li>6. Philipston Marsh SAC (001847),</li> <li>7. Kilduff, Devilsbit Mountain SAC (000934),</li> <li>8. Clare Glen SAC (000930),</li> <li>9. Glenstal Wood SAC (001432),</li> <li>10. Slieve Bernagh Bog SAC (002312),</li> <li>11. Lough Derg, North-East Shore SAC (002241),</li> <li>12. Glenomra Wood SAC (001013),</li> <li>13. Tory Hill SAC (000439),</li> <li>14. Ratty River Cave SAC (002316),</li> <li>15. Askeaton Fen Complex SAC (002279),</li> <li>16. Barrigone SAC (000432),</li> <li>17. Curraghchase Woods SAC (000174),</li> <li>18. Lough Derg (Shannon) SPA (004058),</li> <li>19. River Shannon and River Fergus Estuaries SPA (004077), and</li> <li>20. Stack's to Mullaghareirk Mountains, West Limerick Hills &amp; Mount Eagle SPA (004161)</li> <li>21. Lower River Shannon SAC (002165)</li> <li>22. Lower River Suir SAC (002137), and</li> <li>23. Slieve Felim to Silvermines Mountain SPA (004165)</li> </ol>

<b>Finding of No Significance Effects Report</b>	
<i>Description of the project or plan</i>	<p><b>Overview:</b> The UWF Related Works project, presented for appraisal in the subject appeal to An Bord Pleanála and detailed in this Appropriate Assessment Report, will consist of Internal Windfarm Cabling, Realigned Windfarm Roads, Haul Route Works, a Telecom Relay Pole and Ancillary UWF Related Works.</p> <p><b>Purpose:</b> The purpose of UWF Related Works is to connect the Consented Upperchurch Turbines with the Consented Upperchurch Substation, to realign two lengths of Upperchurch Windfarm Roads, and to provide access to a new relay pole which will mitigate impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseefin Mast, and to facilitate the haulage of turbine components to the Upperchurch Windfarm site.</p>
<i>Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?</i>	No
<i>Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?</i>	<p>Yes</p> <p>In addition to any in-combination effects from the individual Whole UWF Project Elements 1 to 5, the following projects were considered:</p> <ol style="list-style-type: none"> <li>1 Castlewaller Windfarm, Co. Tipperary</li> <li>2 Bunkimalta Windfarm, Co. Tipperary</li> <li>3 Milestone Windfarm, Co. Tipperary</li> <li>4 General Agriculture and Forestry operations, and turf-cutting</li> </ol>
<b>The Assessment of Significant Effects</b>	
<i>Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site</i>	<p>The results are that <b>is there is no potential for UWF Related Works to cause any effects to the following 20 no. European Sites (17 SACs, 3 SPAs):</b></p> <ul style="list-style-type: none"> <li>- Anglesey Road SAC (002125),</li> <li>- Bolingbrook Hill SAC (002124),</li> <li>- Keeper Hill SAC (001197),</li> <li>- Silvermine Mountain SAC (000939),</li> <li>- Silvermine Mountain West SAC (002258),</li> <li>- Philipston Marsh SAC (001847),</li> <li>- Kilduff, Devilsbit Mountain SAC (000934),</li> <li>- Clare Glen SAC (000930),</li> <li>- Glenstal Wood SAC (001432),</li> <li>- Slieve Bernagh Bog SAC (002312),</li> <li>- Lough Derg, North-East Shore SAC (002241),</li> <li>- Glenomra Wood SAC (001013),</li> <li>- Tory Hill SAC (000439),</li> <li>- Ratty River Cave SAC (002316),</li> <li>- Askeaton Fen Complex SAC (002279),</li> <li>- Barrigone SAC (000432),</li> <li>- Curraghchase Woods SAC (000174),</li> <li>- Lough Derg (Shannon) SPA (004058),</li> <li>- River Shannon and River Fergus Estuaries SPA (004077), and</li> <li>- Stack's to Mullaghareirk Mountains, West Limerick Hills &amp; Mount Eagle SPA (004161).</li> </ul>

<b>Finding of No Significance Effects Report</b>			
		Therefore, these EU sites have been ‘Screened Out’ at Stage One of the Appropriate Assessment process.	
<i>Explain why these effects are not considered significant</i>		Stage 1 Conceptual Models have been presented in respect of each European Site within the extended 15km study area. Within same, potential sources of effects have been examined. In respect of the European Sites listed above, the Potential for Significant Effects can be excluded, due to an absence of impact pathways and separation distance. We refer Section 2.8 and 2.9 of the Revised Appropriate Assessment Report for UWF Related Works, for detailed examination.	
<b>Name of Agency or Body Consulted</b>		<b>Summary of Response</b>	
DAU –Michael Murphy NPWS – Jervis Good, Pat Foley, Stefan Jones, Áine Lynch IFI – Michael Fitzsimons, Frank O’Donoghue Tipperary County Council		See ‘See Document Titled Appendix 8.1: Detailed Biodiversity Data and Supplementary Information within Appendix A12 of the Revised Appropriate Assessment Report for UWF Related Works, for a detailed chronology of consultation.	
<b>Data Collected to Carry out the Assessment</b>			
<i>Who carried out the assessment</i>	<i>Sources of Data</i>	<i>Level of assessment completed</i>	<i>Where can the full results of the assessment be accessed and viewed</i>
Inis Environmental Consultants Ltd. <b>Suite 11, Shannon Commercial Properties, Information Age Park, Gort Road, Ennis, Co. Clare</b>	A combination of consultation, desktop studies and comprehensive field surveys.	Following screening it can reasonably be concluded that there is no possibility of Significant Effects on 20 of these 23 European sites as a result of the Development.  With regard to the following listed EU Sites, Significant Effects, in the absence of mitigation (which is not considered at Screening Stage) are considered possible or likely via identified source-pathway linkages: 1. Lower River Shannon SAC (002165) 2. Lower River Suir SAC (002137) 3. Slievefelim to Silvermines SPA (004077)  As a result, there is an obligation on the Competent Authority to carry out an Appropriate Assessment (i.e. Stage Two of the AA process) under Article 6 (3) of the Habitats Directive for this project, and in this context a Stage 2 Appropriate Assessment Report has been completed.	The public office for An Bord Pleanála, Dublin; the public office for Tipperary County Council, Nenagh, Co Tipperary and the public offices of the Minister for Agriculture, Food and the Marine.  In addition, the Appropriate Assessment Reporting Documents can be viewed on the following website: <a href="http://www.upperchurchwindfarm.ie">www.upperchurchwindfarm.ie</a>

# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A14: Scoping of Other Unrelated Projects**



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## SCOPING OF OTHER PROJECTS OR PLANS TO BE CONSIDERED AT SCREENING STAGE

### 1.1.1 Evaluation of Effects on Key Habitats or Species (In Combination)

Effects on European Sites by virtue of cumulative and in-combination pathways to the identified Qualifying Interests of the Lower River Shannon SAC, the Lower River Suir SAC and the Special Conservation Interests of the Slievefelim to Silvermines Mountains SPA, are herein considered. The evaluation is presented per Qualifying Interest or Special Conservation Interest (with reference to the European Sites for which linkage exists identified in Section 2.7 of the Revised Appropriate Assessment Report (February 2019)) and under each Qualifying Interest or Special Conservation Interest listing, the effects are described.

Details of other plans and projects, including web links to their planning documents or other environmental information can be found in Appendix 2.3 of the Revised EIA Report for UWF Related Works, accompanying the appeal to An Bord Pleanála, and available on a dedicated website: [www.upperchurchwindfarm.ie](http://www.upperchurchwindfarm.ie).

#### 1.1.1.1 Receiving Environment for Cumulative Evaluation

Both geographical and time-frame study areas were set for the cumulative evaluation, these boundaries relate to the spatial extent of in combination effects to European Sites (and their Qualifying Interests / Species of Conservation Interest) and to the life-cycle stage during which cumulative effects are expected to occur as a result of the UWF Related Works or the Whole UWF Project, or its respective Project Elements. The conceptual approach to determine the geographical and time frame boundaries to the study area, and by which the selection and review of other plans and projects was considered for in combination effects on European Sites and their Qualifying Interests / Species of Conservation Interest has been defined as follows:

1. The geographical or 'spatial' boundary was identified relevant to the European Sites (and their Qualifying Interests / Species of Conservation Interest) which are in turn considered likely to be affected by at least one of the Elements of the Whole UWF Project.
2. A list of all projects built, consented or expired within a preliminary buffer zone of 15km of the Whole UWF Project Elements was collated from planning searches and independent research,
3. The plans and projects which are located within the geographical boundaries were then identified.
4. The temporal or 'time frame' boundary was defined, to indicate during which life cycle stage the effects of the the UWF Related Works or other Elements of the Whole UWF Project to the European Sites will occur.
5. The potential for the other plans or projects which are located within the geographical boundaries were examined for their potential for cause effects to European Sites (and their Qualifying Interests / Species of Conservation Interest) during the temporal boundary – i.e. during the same period as the Whole UWF Project Elements).
6. Each of the plans or projects which are located within both geographical and temporary boundaries were examined for potential to cause cumulative or in-combination effects to European Sites with the UWF Related Works or Whole UWF Project Elements



Appendix A14 Other Projects or Plans to be considered at screening stage

**Table 1 Geographical boundary of the Cumulative Evaluation Geographical Study Area Extent**

European Site (Qualifying Interest/Special Conservation Interest)	Geographic Boundary of the Study Area	Justification for Study Area Extent
<p>Lower River Shannon SAC (002165)</p> <p>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (91E0)/ Atlantic Salmon (<i>Salmo salar</i>)/ Sea Lamprey (<i>Petromyzon marinus</i>)/ Brook Lamprey (<i>Lampetra planeri</i>)/ River Lamprey (<i>Lampetra fluviatilis</i>)</p>	<p>The regional Mulkear River catchment, including its major tributaries (Bilboa, Clare and Newport Rivers).</p>	<p>The Mulkear River is one of the regional catchment in which the Whole UWF Project is located. The Mulkear River catchment is partially designated within the Lower River Shannon SAC and drains to the Lower Shannon main channel.</p> <p>Extending the scoping area for cumulative effects beyond the Mulkear River catchment would incorporate the whole of the River Shannon SAC catchment; which at this vast scale, the UWF Related Works or the Whole UWF Project would be unlikely to have a significant effect in relation to cumulative impacts. Therefore, the geographic extent is defined relative to the scale and extent of potential interactions arising from the proposed development.</p>
<p>Lower River Suir SAC (002137)</p> <p>Alluvial Forests* (91E0) Freshwater Pearl Mussel White-Clawed Crayfish Atlantic Salmon (<i>Salmo salar</i>)/ Sea Lamprey (<i>Petromyzon marinus</i>) Brook Lamprey (<i>Lampetra planeri</i>)/ River Lamprey (<i>Lampetra fluviatilis</i>)</p>	<p>The River Clodiagh (including Owenbeg River) and Multeen East catchments</p>	<p>The River Clodiagh catchment drains the eastern portion of the Whole UWF Project, particularly in the area of the UWF Related Works and Upperchurch Windfarm. The Clodiagh main channel and the main channel of its tributary the Owenbeg River are partially designated within the Lower River Suir SAC. The Clodiagh drains to the River Suir main channel at Derrymore townland between Thurles town and Clonoulty village.</p> <p>The Multeen East is a tributary within the Multeen River catchment; the Multeen is a tributary of the River Suir, the confluence is located directly north of Golden, Co. Tipperary. The main channel of the Multeen East is designated within the Lower River Suir SAC.</p> <p>Extending the scoping area for cumulative effects beyond the Clodiagh and Multeen catchments would incorporate the whole of the River Suir SAC catchment; at this vast scale, the UWF Related Works or the Whole UWF Project would be unlikely to have a significant effect in relation to cumulative impacts. Therefore, the geographic extent is defined relative to the scale and extent of potential interactions arising from the proposed development.</p>
<p>Otter - Lower River Shannon SAC (002165) and Lower River Suir SAC (002137)</p>	<p>7km</p>	<p>Territory size of Otter averages at most 13.6km equivalent to a 7km buffer and is associated with a 10m wide corridor along all SAC watercourses (as per NPWS Conservation Objectives in respect of both the Lower River Shannon and Lower River Suir).</p>
<p>Hen Harrier-Slievefelim to Silvermines SPA (004077)</p>	<p>SPA plus 5km /Project Element plus 2km</p>	<p>Research on the spatial ecology of Hen Harriers has shown that foraging females spend most of their time within 1km of the nest, while males hunt mostly within 2km of the nest (Arroyo <i>et al.</i>, 2009, Irwin <i>et al.</i>, 2012, Arroyo <i>et al.</i>, 2014). Therefore landscape and habitat changes within 1km of the nest may impact on both male and female foraging, while changes up to 2km from the nest are more likely to affect males only (Arroyo <i>et al.</i>, 2014). SNH (2014) also recommend a 2km buffer out from a proposal site within which data should be collected. A 4km buffer of the SPA in conjunction with a 2km buffer</p>

Appendix A14 Other Projects or Plans to be considered at screening stage

European (Qualifying Interest/Special Conservation Interest)	Site	Geographical Boundary of the Study Area	Justification for Study Area Extent
			of the Development will ensure all likely cumulative effects from other projects are evaluated in the context of the Special Conservation Interest, the Hen Harrier bird and the SPA.

**1.1.1.2 Other Projects/Activities located within the Cumulative Evaluation Geographical Study Area**

Research of other projects or relevant activities in the area identified the projects/activities within the Cumulative Evaluation Geographical Study Area. These Projects/Activities are described in Table 5-12.

**Table 2 Other Projects/Activities identified within the Cumulative Evaluation Geographical Boundary**

Lower River Shannon SAC (002165)		
Qualifying Interest/Special Conservation Interest	Other Project/Activity	Location of Other Project/Activity within the Cumulative Evaluation Geographical Boundary
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (91E0)/ Atlantic Salmon ( <i>Salmo salar</i> )/ Sea Lamprey ( <i>Petromyzon marinus</i> )/ Brook Lamprey ( <i>Lampetra planeri</i> )/ River Lamprey ( <i>Lampetra fluviatilis</i> )	Castlewaller Windfarm	Consented windfarm development, where all 16 no. turbines are located within the Small River catchment. The windfarm is also located upstream of the Lower River Shannon SAC
	Bunkimalta Windfarm	Consented windfarm development, where 5 no. turbines are located within the Clare River catchment and 11 no. turbines are located within the Newport River (Mulkear) catchment. The windfarm is also located upstream of the Lower River Shannon SAC
	Agriculture - Milking Parlour, Bunkey, Lisnagry, Co. Limerick	Consented milking parlour development within the Newport River catchment. The agricultural development is also located upstream of the Lower River Shannon SAC
	Housing Development Doon, Doon, Co. Tipperary	Consented development upstream of the River Shannon SAC within the Mulkear River catchment
	Agricultural sheds and stores, Killuragh, Pallasgreen, Co. Limerick	Consented development upstream of the River Shannon SAC within the Mulkear River catchment
	Killuragh Digester Plant, Pallasgreen, Co. Limerick	Consented development upstream of the River Shannon SAC within the Mulkear River catchment
	Agriculture - Milking Parlour Portnard, Cappamore, Co. Limerick	Consented development upstream of the River Shannon SAC within the Mulkear River catchment
	Housing Developments Annacotty, Co. Limerick	Consented development upstream of the River Shannon SAC within the Mulkear River catchment
Agriculture Forestry operations	Agriculture and Forestry are the predominant land uses in the area of the Whole UWF Project	

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Otter	Castlewaller Windfarm, Tipperary Co.	Consented windfarm development, of 16 no. turbines. In immediate proximity to the Development.
<b>Lower River Suir SAC (002137)</b>		
Floating river vegetation (3260) Alluvial Forests* (91E0) Freshwater Pearl Mussel White-Clawed Crayfish Atlantic Salmon ( <i>Salmo salar</i> ) / Sea Lamprey ( <i>Petromyzon marinus</i> ) Brook Lamprey ( <i>Lampetra planeri</i> ) / River Lamprey ( <i>Lampetra fluviatilis</i> )	Agricultural development, Gortussa, Dundrum, Co. Tipperary	Consented change of use of hay storage to slatted unit for pigs at farm site located within the Multeen River catchment. The agricultural development is also located upstream of the Lower River Suir SAC
	Gortnahalla Wind Turbine development, Co. Tipperary	Consented single turbine development within the Clodiagh River catchment. The turbine development is also located upstream of the Lower River Suir SAC
	General agriculture and Forestry operations	Agriculture and forestry are the predominant land uses within the upper Clodiagh, Owenbeg and Multeen East catchment areas of the Whole Windfarm Project
	Industrial / warehouse Units, Thurles, Co. Tipperary	Consented Industrial / warehouse Units within the Clodiagh River catchment. The development is also located upstream of the Lower River Suir SAC.
	Thurles Regional Water Treatment Works	Consented water treatment works abstracting from the Clodiagh River catchment.
<b>Slievefelim to Silvermines Mountain SPA (04077)</b>		
Hen Harrier	Castlewaller Windfarm, Tipperary Co.	Consented windfarm development, c.12.6km west of UWF Related Works, and c.2km north of the nearest Other Element (UWF Grid Connection)
	Bunkimalta Windfarm, Tipperary Co.	Consented windfarm development, c.9km west of UWF Related Works, and c.5km north of the nearest Other Element (UWF Grid Connection)
	Milestone Windfarm, Tipperary Co.	Operational windfarm development, on lands adjacent to UWF Related Works.
	Forestry and Agriculture	Agriculture and forestry are the predominant land uses in the area of the Whole UWF Project

**1.1.1.3 Other Projects/Activities located in the Cumulative Evaluation Timeframe Study Area**

The Projects/Activities which are located within the Cumulative Evaluation Geographical Boundary were then evaluated for their potential to contribute to cumulative effects on European Sites under consideration within relevant timeframe boundaries associated with the Whole UWF Project (i.e. there is timeframe overlap or it is reasonable to assume that timeframe overlap occurs- a precautionary approach has been taken). This is presented below in Table 5.13.

**Table 3 Cumulative Evaluation Time-Frame Study Area**

Timeframe Study Area - Whole UWF Project lifecycle	Other Plan or Project	Justification for the Timeframe Boundaries
Construction/ Operational Stage	Castlewaller Wind Farm	Construction Stage: No potential for effects with UWF Related Works or the Whole UWF Project (in particular UWF Grid Connection) as the Whole UWF Project will be built before the construction of Castlewaller Windfarm commences. Operational Stage: Yes, potential for cumulative effects during the operational stage of the Whole UWF Project (UWF Grid Connection). Decommissioning Stage: No likelihood of cumulative effect with UWF Related Works/Upperchurch Windfarm due to decommissioning of windfarms not expected to occur during the same period. No decommissioning of UWF Grid Connection.
	Castlewaller HHMP	Implementation of Castlewaller Wind Farm HHMP is considered likely to overlap the Operational Period of Whole UWF Project
Construction/ Operation stages	Bunkimalta Wind Farm	Construction Stage: Yes, potential for effects as the Bunkimalta Windfarm could potential be built during the same time period as the Whole UWF Project. Operational Stage: Yes, potential for cumulative effects during the operational stage of the Whole UWF Project (UWF Grid Connection). Decommissioning Stage: No likelihood of cumulative effect with UWF Related Works/Upperchurch Windfarm due to decommissioning of windfarms not expected to occur during the same period. No decommissioning of UWF Grid Connection.
	Bunkimalta HHMP	Implementation of Bunkimalta Wind Farm HHMP is considered likely to overlap the Operational Period of Whole UWF Project
Construction	Milestone Windfarm	Construction stage: no potential for water quality effects as this windfarm is already constructed. Potential for disturbance effects to hen harriers.
Construction stage	Agriculture - Milking Parlour, Bunkey, Lisnagry, Co. Limerick	Potential for cumulative effects during the construction stage of the Whole UWF Project. Operation & Decommissioning: No potential for significant in-combination effects due to the scale, location and nature of the agricultural development.
Construction stage	Housing Development Doon , Co. Tipperary	Potential for cumulative effects during the construction stage of the Whole UWF Project.

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Timeframe Study Area - Whole UWF Project lifecycle	Other Plan or Project	Justification for the Timeframe Boundaries
		Operation & Decommissioning: No potential for significant in-combination effects due to the scale, location and nature of the housing development.
Construction stage	Agricultural sheds and stores, Killuragh, Pallasgreen, Co. Limerick	Potential for cumulative effects during the construction stage of the Whole UWF Project. Operation & Decommissioning: No potential for significant in-combination effects due to the scale, location and nature of the agricultural development.
Construction stage	Killuragh Digester Plant, Killuragh, Pallasgreen, Co. Limerick	Potential for cumulative effects during the construction stage of the Whole UWF Project. Operation & Decommissioning: No potential for significant in-combination effects due to the scale, location and nature of the digester plant.
Construction stage	Agriculture - Milking Parlour, Portnard, Cappamore, Co. Limerick	Potential for cumulative effects during the construction stage of the Whole UWF Project. Operation & Decommissioning: No potential for significant in-combination effects due to the scale, location and nature of the agricultural development.
Construction stage	Housing Development, Annacotty, Co. Limerick	Potential for cumulative effects during the construction stage of the Whole UWF Project. Operation & Decommissioning: No potential for significant in-combination effects due to the scale, location and nature of the housing development.
Construction stage	Agricultural development, Gortussa, Dundrum, Co. Tipperary	Potential for cumulative effects during the construction stage of the Whole UWF Project. In relation to the operational or decommissioning stages of the Whole UWF Project, only ~0.9km of Internal Windfarm Cabling, and 2 no. turbines (along with associated access roads) from the Upperchurch Windfarm including are located within the same local surface water body (Multeen River) as the agricultural development. Due to the relatively small scale of the Whole UWF Project works within the Multeen River catchment, no impacts on surface water quality or flows, and by virtue of any connection, to the Lower River Suir SAC are anticipated during the operational stage or the decommissioning stage of the project.
Construction stage	Gortnahalla Wind Turbine development, Co. Tipperary	No potential for cumulative effects during the construction stage, as this single turbine development has recently completed construction. Due to the scale of the single turbine development at Gortnahalla, no effects on the Lower River Suir SAC, due to decreases in aquatic habitat quality due to changes in surface water quality or flows, are anticipated during the operational stage or the decommissioning stages.
Construction stage	Telecommunications Support Structure, Knocknahaney, Borrisoleigh, Co. Tipperary	No potential for cumulative effects during the construction stage as this is an existing structure. No potential for cumulative effects during the operation or decommissioning stages, due to the scale of the telecoms development.

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Timeframe Study Area - Whole UWF Project lifecycle	Other Plan or Project	Justification for the Timeframe Boundaries
Construction stage	Industrial / warehouse Units, Thurles, Co. Tipperary	Yes potential for cumulative effects during the construction stage of the Whole UWF Project, as the industrial units may potentially be constructed during the same period. Operation & Decommissioning: No potential for significant in-combination effects due to the scale, location and nature of the operational industrial units which are located upstream of the Lower River Suir SAC.
Construction stage	Thurles Regional Water Treatment Works	Yes potential for cumulative effects during the construction stage of the Whole UWF Project, as impacts on surface water quality or flows by the water treatment works are anticipated during the operational stage of Water Treatment Works.
Construction / Operation/ Decommissioning	Forestry and Agriculture and Turf -cutting	Ongoing in all stages of the Whole UWF Project stages.

**1.1.1.4 Cumulative Conceptual Site Model**

Other plans and projects will generally have the same impact pathways as those described in the Conceptual Site Model for the Whole UWF Project at Stage 1 and carried forward to Stage 2, due to these Other Plans and Projects constituting either renewable energy projects or projects involving civil works. It was considered that there is no potential for cumulative effects with other projects where no likelihood of effects from UWF Related Works or the Whole UWF Project Elements will occur in the first instance.

In the table below, the effects on each Qualifying Interest/Special Conservation Interest under consideration at Stage 2 is examined for likely cumulative effects with other plans or projects, which are either included for further examination and analysis in the following Sections or ruled out from further examination and analysis with justification for same.

**Table 4: Conceptual Model for Cumulative Effects on European Sites – Lower River Shannon SAC (002165)**

Potential Impact Source Identified	Pathway(s)	Qualifying Interests	Whole UWF Project Elements Impacts	Castlewaller Windfarm Examination for likely cumulative effects	Bunkimalta Windfarm Examination for likely cumulative effects	Milking Parlour - Bunkey, Lisnagry Examination for likely cumulative effects	Forestry and Agriculture
		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]	Riparian habitat degradation	<u>No: precluded from further evaluation</u> Outside the timeframe boundary. No potential for in combination effects.	<u>No: precluded from further evaluation</u> Construction activities will be at least a minimum of 50m where possible. Separation distance precludes in combination effects.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.
<b>Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brash storage.</b>	water runoff flowpaths, watercourses, air	Disturbance to Fisheries	<u>No: precluded from further evaluation</u> Outside the timeframe boundary. No potential for in combination effects.	<u>No: precluded from further evaluation</u> Construction activities will be at least a minimum of 50m where possible. Separation distance and cited Sediment Control Plan precludes in combination effects.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.
		Changes in Flow Regime	<u>No: precluded from further evaluation</u> Outside the timeframe boundary. No potential for in combination effects.	<u>No: precluded from further evaluation</u> No potential for cumulative morphological effects due to separation; Construction activities will be at least a minimum of 50m where possible.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.
		Decrease in habitat quality via: surface water runoff, sediment entrainment or	<u>No: precluded from further evaluation</u> Outside the timeframe boundary.	<u>No: precluded from further evaluation</u> Construction activities will be at least a minimum of	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.	<u>No: precluded from further evaluation</u> Effects are unlikely to be significant.

Appendix A14 Other Projects or Plans to be considered at screening stage

Potential Impact Source Identified	Pathway(s)	Qualifying Interests	Whole UWF Project Elements Impacts	Castlewaller Windfarm Examination for likely cumulative effects	Bunkimalta Windfarm Examination for likely cumulative effects	Milking Parlour - Bunkey, Lisnagry Examination for likely cumulative effects	Forestry and Agriculture
			release; release of fuels oils/ chemicals, surface/ ground water quality impacts	No potential for in combination effects.	50m where possible. A sediment control plan will be in place.	Effects are unlikely to be significant.	Effects are unlikely to be significant.
Instream works; Excavation works	water runoff flowpaths, watercourse s, air	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]	Spread of aquatic invasive species	No:precluded from further evaluation Outside the timeframe boundary. No potential for in combination effects.	No:precluded from further evaluation Construction activities will be at least a minimum of 50m where possible.	No:precluded from further evaluation Effects are unlikely to be significant.	No:precluded from further evaluation Effects are unlikely to be significant.
Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and	land cover, contact, air, visibility	Otter	Disturbance to Otter	No:precluded from further evaluation ;None Recorded in Baseline Studies.	No:precluded from further evaluation Effects are unlikely to be significant.	No:precluded from further evaluation Effects are unlikely to be significant.	No:precluded from further evaluation ;Effects are unlikely to be significant.



Appendix A14 Other Projects or Plans to be considered at screening stage

Potential Impact Source Identified	Pathway(s)	Qualifying Interests	Whole UWF Project Elements Impacts	Castlewaller Windfarm Examination for likely cumulative effects	Bunkimalta Windfarm Examination for likely cumulative effects	Milking Parlour - Bunkey, Lisnagry Examination for likely cumulative effects	Forestry and Agriculture
vibration from construction works and construction machinery; in, or in close proximity to, watercourses							

Table 5: Conceptual Site Model for Cumulative Effects on European Sites – Lower River Suir SAC (002137)

Potential Impact Source Identified	Pathway(s)	Qualifying Interest	Whole UWF Project Impacts	Industrial / warehouse Units – Thurles Scoping for likely cumulative effects	Thurles Regional Water Treatment Works Scoping for likely cumulative effects	Forestry and Agriculture
Movement of soil, machinery; earthworks, excavations, overburden storage; use of fuels, chemicals, cement based compounds; excavation dewatering; tree felling, brush storage.	water runoff flowpaths, watercourses, air	Alluvial Forests (91E0)* (priority habitat) <i>Taxus baccata</i> woods of the British Isles [91J0] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Water courses of plain to montane levels with the Ranunculus fluitans and Callitriche-Batrachion vegetation [3260] Freshwater Pearl Mussel [1029] White-clawed Crayfish [1092] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106] Otter [1355]	Riparian habitat degradation	<u>No:precluded from further evaluation</u> Due to the small scale nature of the site, and the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	<u>No:precluded from further evaluation</u> Due to the small scale nature of the site, and the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	<u>No:precluded from further evaluation</u> Effects are unlikely to be significant.
			Changes in Flow Regime	<u>No:precluded from further evaluation</u> Due to the small scale nature of the site, and the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	<u>No:precluded from further evaluation</u> It is assumed that the consented development will implement all mitigation measures in full, as prescribed, in order to achieve the predicted residual impact significance. On this basis, no likely significant effects on water quality are likely to arise which may interact cumulatively with the UWF Whole Project. Furthermore, taking account of the the large downstream	<u>No:precluded from further evaluation</u> Effects are unlikely to be significant.

Appendix A14 Other Projects or Plans to be considered at screening stage

Potential Impact Source Identified	Pathway(s)	Qualifying Interest	Whole UWF Project Impacts	Industrial / warehouse Units – Thurles Scoping for likely cumulative effects	Thurles Regional Water Treatment Works Scoping for likely cumulative effects	Forestry and Agriculture
			Decrease in habitat quality via: surface water runoff, sediment entrainment or release; release of fuels oils/ chemicals, surface/ ground water quality impacts	<u>No:precluded from further evaluation</u> Due to the small scale nature of the site, and the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	distance to where cumulative effects can occur(20km), effects are unlikely to be significant . <u>No:precluded from further evaluation</u> It is assumed that the consented development will implement all mitigation measures in full, as prescribed, in order to achieve the predicted residual impact significance. On this basis, no likely significant effects on water quality are likely to arise which may interact cumulatively with the UWF Whole Project. Furthermore, taking account of the the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	<u>No:precluded from further evaluation</u> Effects are unlikely to be significant.
			Spread of Aquatic Invasive Species	<u>No:precluded from further evaluation</u>	<u>No:precluded from further evaluation</u>	<u>No:precluded from further evaluation</u>

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Potential Impact Source Identified	Pathway(s)	Qualifying Interest	Whole UWF Project Impacts	Industrial / warehouse Units – Thurles Scoping for likely cumulative effects	Thurles Regional Water Treatment Works Scoping for likely cumulative effects	Forestry and Agriculture
Construction works; movement of construction machinery and vehicles; presence of construction personnel; noise and vibration from construction works and construction machinery; in, or in close proximity to, watercourses	land cover, contact, air, visibility	Freshwater [1029] Pearl Mussel White-clawed Crayfish [1092] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106] Otter [1355]	Disturbance to/ or Displacement of Aquatic Species	Due to the small scale nature of the site, and the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	Due to the small scale nature of the site, and the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	Effects are unlikely to be significant.
				No:precluded from further evaluation Due to the small scale nature of the site, and the large downstream distance to where cumulative effects can occur (20km), effects are unlikely to be significant.	No:precluded from further evaluation It is assumed that the consented development will implement all mitigation measures in full, as prescribed, in order to achieve the predicted residual impact significance. On this basis, no likely significant effects on water quality are likely to arise which may interact cumulatively with the UWF Whole Project. Furthermore, taking account of the the large downstream distance to where cumulative effects can occur(20km),	No:precluded from further evaluation Effects are unlikely to be significant

Potential Impact Source Identified	Pathway(s)	Qualifying Interest	Whole UWF Project Impacts	Industrial / warehouse Units – Thurles Scoping for likely cumulative effects	Thurles Regional Water Treatment Works Scoping for likely cumulative effects	Forestry and Agriculture
					effects are unlikely to be significant.	

Table 6: Conceptual Site Model for Cumulative Impacts- Slievefelim to Silvermines SPA (004077

Source(s) of Biodiversity Impacts	Pathway(s)	Special Conservation Interest	Whole Project Impacts	UWF Impacts	Castlewaller Windfarm Scoping for likely cumulative effects	Bunkimalta Wind Farm Scoping for likely cumulative effects	Forestry/Agriculture/Turf-cutting Scoping for likely cumulative effects
Hen Harrier							
Land Use Change	Land Cover	Hen Harrier	Reduction in or Loss of suitable or potentially suitable Hen Harrier Foraging Habitat	Yes –Scoped In	Yes-Scoped In	Yes-Scoped In	Yes- Scoped In
Forestry Felling/ Operating Machinery	Contact	Hen Harrier	Inadvertant Mortality of Hen Harrier in or at Nest or Roost Sites	No- It is assumed that measures to prevent harmful effects on Hen Harrier as conditioned in planning will be implemented. No winter roosting is described. No likelihood of significant effects.	No- It is assumed that measures to prevent harmful effects on Hen Harrier as described in the SHMP and relevant reporting such as the submitted NIS and conditioned in planning will be implemented. No likelihood of significant effects.	Yes – Forestry Scoped In No – Agriculture & Turbary Agricultural Activities will not overlap potential breeding or roosting habitats. Restrictions on further turf cutting in intact areas/protected areas, and; the limited extent of suitable turbary habitat within the Hen Harrier SPA overall (4%) results in no likelihood of significant cumulative effects.	
Noise and Human Activity	Visibility	Hen Harrier	Disturbance / Displacement of Nesting /	No- It is assumed that measures to prevent harmful effects on Hen Harrier as conditioned in	No- Construction works will be confined to times outside the main breeding season to avoid	Yes- Forestry Scoped In No – Agriculture & Turbary	

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Source(s) of Biodiversity Impacts	Pathway(s)	Special Conservation Interest	Whole Project Impacts	UWF	Castlewaller Windfarm Scoping for likely cumulative effects	Bunkimalta Wind Farm Scoping for likely cumulative effects	Forestry/Agriculture/Turf-cutting Scoping for likely cumulative effects
			Roosting Harrier	Hen	planning will be implemented. No winter roosting is described. No likelihood of significant effects.	disturbance to birds. Monitoring and mitigation measures during operation in the event a breeding territory is found within 500m of a turbine will avoid disturbance to breeding birds. No winter roosting is described. No likelihood of significant effects.	Agricultural Activities will not overlap potential breeding or roosting habitats. Restrictions on further turf cutting in intact areas/protected areas, and; the limited extent of suitable turbarry habitat within the Hen Harrier SPA overall (4%) results in no likelihood of significant cumulative effects.

*Appendix A14 Other Projects or Plans to be considered at screening stage*